



COUNTY OF GALVESTON
SPECIFICATIONS AND CONTRACT DOCUMENTS

Friendswood Lakes Blvd.
Bid # B201029



[Handwritten Signature]
06/09/2020

Prepared by:
Terra Associates, Inc.
TBPE Registration #F-003832

June 2020

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**GALVESTON COUNTY
PURCHASING DEPARTMENT**



INVITATION TO BID

ITB #B201029

FRIENDWOOD LAKES BLVD.

BID DUE DATE: 07/09/2020

2:00 P.M. CST

***Rufus Crowder, CPPO, CPPB
Purchasing Agent
Galveston County
722 Moody (21st Street)
Fifth (5th) Floor
Galveston, Texas 77550
(409) 770-5372***



**INVITATION TO BID
FRIENDSWOOD LAKES BLVD.
GALVESTON COUNTY, TEXAS**

Sealed bids in **sets of four (4), one (1) unbound original and three (3) copies** will be received in the office of the County Purchasing Agent until **2:00 P.M. CST, on Thursday, July 9, 2020** and opened immediately in that office in the presence of the Galveston County Auditor and the Purchasing Agent. Sealed bids are to be delivered to Rufus G. Crowder, CPPO CPPB, Galveston County Purchasing Agent at the Galveston County Courthouse, 722 Moody (21st Street), Floor 5, Purchasing, Galveston, Texas 77550, (409) 770-5372. **The time stamp clock located in the Purchasing Agent's office shall serve as the official time keeping piece for this solicitation process. Any bids received after 2:00 P.M. CST on the specified date will be returned unopened.**

Purpose:

Galveston County is seeking a vendor for construction of a four-lane, divided, major thoroughfare consisting of paving, sidewalks, storm sewer, water line and sanitary sewer. The limits are from Stoney Lake Drive SE to approximately 1,500 feet north of West Blvd. in Friendswood, TX.

All bids must be marked on the outside of the envelope:
ITB #B201029, Friendswood Lakes Blvd.

Bids name and return address, should be prominently displayed on the bid package for identification purposes.

Bid Specifications can be obtained by visiting the Galveston County website @
<http://www.galvestoncountytexas.gov/pu/Pages/BidListing.aspx>

Bid prices shall be either lump sum or unit prices as shown on the bid sheet, if applicable. The net price will be delivered to Galveston County, including all freight, shipping, and license fees. Galveston County is tax exempt and no taxes should be included in your proposal pricing.

A non-mandatory pre-bid conference will be held on Tuesday, June 23, 2020 at 10:00 a.m.

Due to the COVID-19 pandemic, the County of Galveston has instituted measures to guard against the spread of the virus. This includes the prohibition of in-person meetings, social distancing, and stay-at-home requirements for employees.

The Pre-Bid Conference shall take place via video/tele-conference and the instructions are listed below and on the County's Purchasing website:

Minimum System Requirements for Video Conferencing:

1. High-resolution webcam;
2. Computer processing minimum: 2 GB of RAM and a quad-core processor;
3. Network bandwidth: 1 Mbps is sufficient for 15 fps at 720p resolution;

Calling from a mobile device:

1. Front facing camera;
2. In ear headphone with built in mic

Instructions for Video Conferencing:

1. [Click here](#) or navigate to <https://guest.lifesize.com/1907077>
2. Enter Name and email (optional);
3. Click the Terms of Service and Privacy Policy checkbox;
4. Click Join Meeting

***Note - be sure to enable audio and video.**

Copies of bid/Contract Documents may also be obtained from www.Civcast.com search Friendswood Lakes Blvd.. Bidders must register on this website in order to view and/or download specifications and plans for this project. There is NO charge to view or download documents. If copies of the bidding documents are to be mailed, please contact Terra Associates, Inc. at 713 993-0333 for postage and handling. Return of documents is not required and no refund will be granted.

Upon satisfaction of contractual terms (e.g., goods delivered in promised condition, services rendered as agreed, etc.), contractor shall be paid via Galveston County's normal accounts payable process.

Bonding Requirements:

- **PROPOSAL GUARANTEE:** Evidencing its firm commitment to engage in the contract if Proposer is selected for award of contract, each Proposer is required to furnish with their proposal a Cashier's Check, or an acceptable Bidder's Bond, in the amount of five percent (5%) of the total contract price. The Bidder's Bond must be executed with a surety company authorized to do business in the State of Texas. Failure to furnish the bid/proposal guarantee in the proper form and amount, by the time set for opening of bids may be cause or rejection of the proposal.
- **PERFORMANCE AND PAYMENT BONDS:** Successful proposer, before beginning work, shall execute a performance bond and a payment bond, each of which must be in the amount of the contract. The required payment and performance bonds must each be executed by a corporate surety in accordance with Section 1, Chapter 87, Acts of the 56th Legislature, Regular Session, 1959 (Article 7.19-1, Vernon's Texas Insurance Code).

Attention is called to the fact that not less than, the federally determined prevailing (Davis-Bacon and Related Acts) wage rate, as issued by the Office of Rural Community Affairs and contained in the contract documents, must be paid on this project. In addition, the successful bidder must ensure that employees and applicants for employment are not discriminated against because of race, color, religion, sex age or national origin.

The Galveston County Commissioners' Court reserves the right to waive any informality and to reject any and all bids and to accept the bid or bids which, in its opinion, is most advantageous to Galveston County with total respect the governing laws.

All contractors/subcontractors that are debarred, suspended or otherwise excluded from or ineligible for participation on federal assistance programs may not undertake any activity in part or in full under this project

Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County

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1. BID PACKAGE

*The Invitation to Bid, general and special provisions, drawings, specifications/line item details, contract documents and the Bid sheet are all part of the Bid package. **BIDs must be submitted in sets of three (3), one (1) unbound original and two (2) copies** on the forms provided by the County if County forms are provided, including the Bid sheets completed in their entirety and signed by an authorized representative by original signature. Failure to complete and sign the Bid sheets/contract page(s) may disqualify the Bid from being considered by the Commissioners' Court. Any individual signing on behalf of the Bidder expressly affirms that he or she is duly authorized to tender this Bid and to sign the Bid sheet/contract under the terms and conditions in this bid on behalf of the Bidder and to bind the Bidder to the terms and conditions of this bid and the Bidder's response hereto. Bidder further understands that its' signing of the contract shall be of no effect unless the contract is subsequently awarded by the Commissioners' Court and the contract properly executed by the Commissioners' Court. All figures must be written in ink or typed. Figures written in pencil or with erasures are not acceptable. However, mistakes may be crossed out, corrections inserted, and initialed in ink by the individual signing the bid. If there are discrepancies between unit prices quoted and extensions, the unit price shall prevail. Each Bidder is required to thoroughly review this entire Bid package to familiarize themselves with the Bid procedures, the plans and specifications for the requested work, as well as the terms and conditions of the contract the successful Bidder will execute with the County.*

2. BIDDER'S RESPONSIBILITY

The Bidder must affirmatively demonstrate its responsibility. The Bidder must also meet the following minimum requirements:

- A. have adequate financial resources or the ability to obtain such resources as required;
- B. be able to comply with all federal, state, and local laws, rules, regulations, ordinances and orders regarding this Invitation to Bid;
- C. have a satisfactory record of performance;
- D. have a satisfactory record of integrity and ethics; and
- E. be otherwise qualified and eligible to receive an award.

3. TIME FOR RECEIVING BIDS

Bids may be submitted by mail or hand delivery and **must be submitted only to the Galveston County Purchasing Agent**. If by delivery, the Bidder must deliver to the reception desk in the County Purchasing Agent's Office. The delivery and mailing instructions for the Galveston Count Purchasing Agent are the following:

**Rufus Crowder, CPPO CPPB
Galveston County Purchasing Agent
722 Moody, Fifth (5th) Floor
Galveston, Texas 77550**

Bids will **not** be accepted by facsimile transmission or by electronic mail (email) unless superseded by instructions within the Special Provisions sections of this solicitation. Bids must be received by the County Purchasing Agent on or before the deadline for the opening of the bids. For clarity, mailing date/postmark is **not** sufficient – bids **must be received** by the County Purchasing Agent on or before the deadline. Late bids will not be accepted and will be returned to the bidder unopened. Bids received prior to the submission deadline will be maintained unopened until the specified time for opening.

The County Purchasing Agent will accept bids from 8:00 a.m. to 5:00 p.m. on each business day up to the submission deadline. Business days do not include Saturdays and Sundays, and do not include other days in which the County is closed for business in observance of holidays or for other reasons.

The time-stamp clock within the County Purchasing Agent's Office shall be the official time-clock for the purpose of this solicitation and thus shall be the determinant of whether the bid was timely received.

The bidder should prominently identify the procurement number and name on the outside of the envelope/ mailing package. A label shall be provided for this purpose and usage of the label is preferred. If the bidder fails to identify the bid on the outside of the envelope as required, the Purchasing Agent will open the envelope for the sole purpose of identifying the bid number for which the submission was made. The envelope will then be resealed. No liability will attach to a County office or employee for the premature opening of a bid.

If a bid is not submitted, return this Invitation to Bid and state reason (s), otherwise your name may be removed from the Purchasing Agent's mailing list.

4. **COMPETITIVENESS, INTEGRITY, INQUIRIES AND QUESTIONS**

To prevent biased evaluations and to preserve the competitiveness and integrity of the procurement process, **bidders are to direct all communications regarding this invitation to bid only to the Galveston County Purchasing Agent**, unless otherwise specifically noted.

Do not contact the requesting department. Attempts by offering firms to circumvent this requirement will be viewed negatively and may result in rejection of the bid of the firm found to be in non-compliance.

All questions regarding this Invitation to Bid must be submitted in writing to:

Rufus Crowder, CPPO CPPB, Purchasing Agent
722 Moody
Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 621-7997
E-mail: purchasing.bids@co.galveston.tx.us

All questions received and the responses thereto will be mailed, emailed, or faxed to all prospective bidders by addendum. No inquiries except clarification of instructions will be addressed by telephone.

Bidder is advised to carefully review this Invitation to Bid – it provides specific information necessary to aid participating firms in formulating a thorough response. Bidder's failure to examine all documents shall not entitle the bidder to any relief from the conditions imposing in the Invitation to Bid and the resultant contract.

An authorized person from the bidder must sign the bid. This signatory must be a person from the submitting firm who is duly authorized to tender and sign the bid on behalf of the bidder and to bind the bidder to the terms and conditions of this Invitation to Bid, the bidder's response, and all other terms and conditions of the contract. By this signature, the bidder further acknowledges that the bidder has read the bid documents thoroughly before submitting a bid and will fulfill the obligations in accordance to the terms, conditions, and specifications detailed herein.

5. BID OPENING

The Purchasing Agent shall open the bids on the date and time specified herein. Information read aloud at the bid opening is at the sole discretion of the Purchasing Agent. The Purchasing Agent will examine bids promptly and thoroughly.

6. WITHDRAWAL OF BID/FIRM BID RULE

Bidders may request withdrawal of their sealed bid prior to the scheduled bid opening time provided the request for withdrawal is submitted to the Purchasing Agent in writing. No bids may be withdrawn for a period of sixty (60) calendar days after opening of the bids.

7. COMMISSIONERS COURT

No contract is binding on the County until it is properly placed on the Commissioners Court agenda, approved in open Court, authorized to be executed by the County Judge, and fully executed by both parties.

Department heads and elected officials are not authorized to enter into any type of agreement or contract on behalf of the County. Only the Commissioners Court acting as a body may enter into a contract on behalf of and contractually bind the County. Additionally, department heads and elected officials are not authorized to agree to any type of supplemental agreements or contracts for goods or services. Supplemental agreements are subject to review by the County Legal Department prior to being accepted and signed by the County's authorized representative.

8. REJECTION OF BIDS/DISQUALIFICATION

Galveston County, acting through its Commissioners Court, reserves the right to:

- reject any and all Bids in whole or in part received by reason of this Invitation to Bid;
- waive any informality in the Bids received;
- disregard the Bid of any Bidder determined to be not responsible;
- disregard the Bid of any Bidder determined to have not submitted its Bid timely; and/or;
- discontinue its efforts for any reason under this Bid package at any time prior to actual execution of contract by the County.

Bidders may be disqualified and rejection of Bids may be recommended to the Commissioners Court for any of (but not limited to) the following causes:

- A. Failure to use the bid forms furnished by the County, if applicable;
- B. Lack of signature by an authorized representative of bidder;
- C. Failure to properly complete the bid;
- D. Engaging in communications regarding this procurement during the pendency of this procurement with County officials and/or personnel who are not within the Purchasing Agent's Office;
- E. Failure to meet the mandatory requirements of this invitation to bid; and/or
- F. Evidence of collusion among bidders.

9. RESTRICTIVE OR AMBIGUOUS SPECIFICATIONS

It is the responsibility of the prospective Bidder to review the entire Invitation to Bid packet and to notify the Purchasing Agent if the specifications are formulated in a manner that would restrict competition or appear ambiguous. Any protest or question(s) regarding the specifications or Bid procedures must be received in the Purchasing Agent’s Office not less than seventy-two (72) hours prior to the time set for Bid opening. Bidders are to submit their Bid as specified herein or propose an approved equal.

10. SUBSTITUTES/DESCRIPTION OF MATERIALS AND EQUIPMENT

Any brand name or manufacturer reference used herein is intended to be descriptive and not restrictive, unless otherwise noted, and is used to indicate the type and quality of material. The term “or equal” if used, identifies commercially produced items that have the essential performance and salient characteristics of the brand name stated in the item description. All supplies, material, or equipment shall be new and of the most suitable grade for the purpose intended. For clarification, “new” includes products containing recovered materials that are EPA-designated items and additionally see Section 63 of these General Provisions on contracts involving federal funds. It is not the County’s intent to discriminate against any materials or equipment of equal merit to those specified. However, if Bidder desires to use any substitutions, prior written approval must be obtained from the Purchasing Agent and sufficiently in advance such that an addendum may be issued. All material supplied must be one hundred percent (100%) asbestos free. Bidder, by submission of its bid, certifies that if awarded any portion of this procurement, the bidder will supply only material and equipment that is 100% asbestos free.

11. EXCEPTIONS TO BID

The Bidder will list on a separate sheet of paper any exceptions to the conditions of the bid. This sheet will be labeled, “Exceptions to Bid Conditions”, and will be attached to the bid. If no exceptions are stated, it will be understood that all general and special conditions will be complied with, without exception.

The Bidder must specify in its Bid any alternatives it wishes to propose for consideration by the County. Each alternative should be sufficiently described and labeled within the Bid and should indicate its possible or actual advantage to the program being offered.

The County reserves the right to offer these alternatives to other Bidders.

12. PRICING

Bids will be either lump sum or unit prices as shown on the Bid sheet. The net priced items will be delivered to Galveston County, including all freight, shipping, and delivery charges.

Cash discount must be shown on bid, otherwise prices will be considered net. Unless prices and all information requested are complete, Bid may be disregarded and given no consideration.

In case of default by the contractor, the County of Galveston may procure the articles or services from other sources and may deduct from any monies due, or that may thereafter become due to the contractor, the difference between the price named in the contract of purchase order and the actual cost thereof to the County of Galveston. Prices paid by the County of Galveston shall be considered the prevailing market price at the time such purchase is made. Periods of performance may be extended if the facts as to the cause of delay justify such extension in the opinion of the Purchasing Agent and the Commissioners’ Court.

13. PROCUREMENT CARD (P-CARD) PROGRAM

The County of Galveston participates in a Procurement Card (P-Card) program that allows payments made to a vendor by credit card. This method typically results in substantially faster bill payments, sometimes within three (3) to five (5) days of the actual transaction date. All transaction fees from the card provider are to be paid by the successful contractor. If your company will accept payment via credit card (Visa, MasterCard), please notate this in your Bid submittal.

14. PASS THROUGH COST ADJUSTMENTS

Except in instances of extreme extenuating circumstances Contractor prices shall remain firm throughout the contract period and any renewals. Examples of extreme extenuating circumstances include such situations as a nationwide rail strike, oil shortage or oil embargo.

In extreme extenuating circumstances, Contractors may be allowed to temporarily “pass through” additional costs they are forced to incur through no fault of their own. A request for a pass through cost increase will not be considered unless a Contractor’s cost for the Contractor’s product exceeds 10% over the original cost for the product. Also, the increase in cost must be nationwide and consistent for a minimum period of sixty (60) days. Costs that historically are anticipated to rise over a period of time (for example only, such as wages or insurance costs) do not qualify for pass through. If a Contractor thinks he will be asking for a pass through cost adjustment during the term of the contract, then the original cost of the product to Contractor must be stated in Contractor’s original bid.

A request for a pass through cost does not guarantee that one will be granted. Contractors must submit such information on each request as required by the County Purchasing Agent. The County Purchasing Agent will review each request on a case-by-case basis and if valid, submit the request to Commissioners Court for authorization and determination of the appropriateness of each request as well as amount and duration of increase. Contractors will not be permitted any additional compensation for mark-ups or profits based on the increase in price. Rather, such additional compensation will be limited to the actual increase in original cost to the Contractor as such increase is reflected by the original cost stated in the bid. But in no event will the amount of additional compensation exceed 25% increase in Contractor’s original cost for the product as such cost is reflected in Contractor’s original Bid or the duration exceed a period of sixty (60) days. In addition should the cost, during the period of the pass through, return to normal or decrease to below pre pass through prices, appropriate downward adjustments shall be made. No more than one pass through adjustment will be permitted per year.

15. MODIFICATION OF BIDS

A Bidder may modify a bid by letter at any time prior to the submission deadline for receipt of Bids. Modification requests must be received prior to the submission deadline. Modifications made before opening time must be initialed by Bidder guaranteeing authenticity. Bids may not be amended or altered after the official opening with the single exception that any product literature and/or supporting data required by the actual specifications, if any, will be accepted at any time prior to the Commissioners’ Court considering of same.

16. PRE-BID CONFERENCE

A pre-bid conference for the purpose of discussing contract requirements and answering questions of prospective bidders may be conducted in this procurement. A pre-bid conference may be mandatory or voluntary. If the pre-bid conference is mandatory, then the County is authorized to condition acceptance of a bid on compliance with attendance. The Special Provisions of this procurement shall specify if a pre-bid conference is to be held and shall specify whether the pre-bid conference is mandatory or voluntary. Only a principal, officer, or employee of the bidder

may represent the bidder at the pre-bid conference and no person may represent more than one bidder at the pre-bid conference.

17. SIGNATURE OF BIDS

Each Bid shall give the complete mailing address of the Bidder and be signed by an authorized representative by original signature with the authorized representative's name and legal title typed below the signature line. Each bid shall include the Bidder's Federal Employer Identification Number (FEIN). Failure to sign the Contract page(s) and bid response sheets may disqualify the bid from being considered by the County. The person signing on behalf of the Bidder expressly affirms that the person is duly authorized to tender the bid and to sign the bid sheets and contract under the terms and conditions of this Invitation to Bid and to bind the Bidder thereto and further understands that the signing of the contract shall be of no effect until it is properly placed on the Commissioners' Court agenda, approved in open Court, authorized to be executed by the County Judge, and fully executed by both parties.

18. AWARD OF BIDS – EVALUATION CRITERIA AND FACTORS

The award will be made to the responsible Bidder whose bid is determined to be the lowest and best evaluated offer demonstrating the best ability to fulfill the requirements set forth in this Invitation to Bid. **The proposed cost to the County will be considered firm and cannot be altered after the submission deadline.**

“Lowest and best” means a bid or offer providing the best value considering associated direct and indirect costs, including transport, maintenance, reliability, life cycle, warranties, and customer service after a sale.

In determining the lowest and best bid for a contract for the purchase of earth-moving, material-handling, road maintenance, or construction equipment, the Commissioners Court may also consider the information submitted under Section 262.0255 of the Local Government Code; and in determining the lowest and best bid for a contract for the purchase of road construction material, the Commissioners Court may consider the pickup and delivery locations of the bidders and the cost to the county of delivering or hauling the material to be purchased. The Commissioners Court may award contracts for the purchase of road construction material to more than one bidder if each of the selected bidders submits the lowest and best bid for a particular location or type of material.

Each Bidder, by submitting a bid, agrees that if its' bid is accepted by the Commissioners' Court, such Bidder will furnish all items and services upon which prices have been tendered and upon the terms and conditions in this bid and contract.

The contractor shall commence work only after the transmittal of a fully executed contract and after receiving written notification to proceed from the County Purchasing Agent. The contractor will perform all services indicated in the bid in compliance with this contract.

Neither department heads nor elected officials are authorized to sign any binding contracts or agreements prior to being properly placed on the Commissioners' Court agenda and approved in open court. Department heads and other elected officials are not authorized to enter into any type of agreement or contract on behalf of Galveston County. Only the Commissioners' Court, acting as a body, may enter into a contract on behalf of the County. Additionally, department heads and other elected officials are not authorized to agree to any type of supplemental agreements or contracts for goods or services. Supplemental agreements are subject to review by the County Legal Department prior to being signed by the County's authorized representatives.

The County of Galveston reserves the right to accept bids on individual items listed, or group items, or on the bid as a whole; to reject any and all bids; to waive any informality in the bids; to disregard the bids that are not submitted timely; to disregard the bids of bidders determined to be not responsible; and to accept the bid that appears to be in the

best interest of the County. The selection process may, however, include a request for additional information or an oral presentation to support the written bid.

In determining and evaluating the best bid, the pricing may not necessarily be controlling, but quality, equality, efficiency, utility, general terms, delivery, suitability of the service offered, and the reputation of the service in general use will also be considered along with any other relevant items. The Commissioners' Court shall be the sole judge in the determination of these matters.

The County reserves the right to reject any or all Bids in whole or in part received by reason of this Invitation to Bid and may discontinue its efforts under this Invitation to Bid for any reason or no reason or solely for the County's convenience at any time prior to actual execution of the contract by the County.

A Bidder whose bid does not meet the mandatory requirements set forth in this Invitation to Bid may be considered non-compliant.

The invitation to submit a bid which appears in the newspaper, or other authorized advertising mediums, these general provisions, the specifications which follow, the Bid sheets, and any addenda issued are all considered part of the Bid.

Each Bidder, by submitting a bid, agrees that if its bid is accepted by the Commissioners' Court, such Bidder will furnish all items and services upon the terms and conditions in this Invitation to Bid and the resultant contract.

Notice of contract award is anticipated to be made within ninety (90) days of opening of Bids to the lowest responsive and responsible contractor, whose bid complies with all the requirements in the Invitation to Bid.

Contractor shall submit to the County, for approval, within ten (10) days from notice of contract award, all Certificates of Insurance evidencing the required coverage as described under Section 35, Requirement of and Proof of Insurance, or if different, then as described within the Special Provisions or resultant contract.

The contractor shall not commence work under these terms and conditions of the contract until all applicable Purchase Orders, Certificates of Insurance, Performance and Payment Bonds, and Irrevocable Letters of Credit (if required) have been approved by the County of Galveston and the Contractor has received notice to proceed in writing and an executed copy of the contract from the County Purchasing Agent.

19. DISPUTE AFTER AWARD/PROTEST

Any actual or prospective Bidder who is allegedly aggrieved in connection with the solicitation of this Invitation to Bid or award of a contract resulting therefrom may protest. The protest shall be submitted in writing to the Purchasing Agent within seven (7) calendar days after such aggrieved person knows of or should have known of the facts giving rise thereto. If the protest is not resolved by mutual agreement, the Purchasing Agent will promptly issue a decision in writing to the protestant. If the protestant wishes to appeal the decision rendered by the Purchasing Agent, such appeal must be made to the Commissioners' Court through the Purchasing Agent. The decision of the Commissioners' Court will be final. The Commissioners' Court need not consider protests unless this procedure is followed.

20. PUBLIC INFORMATION ACT (f/k/a Open Records Act)

The bidder acknowledges that the County is a government body for purposes of the Public Information Act, codified as Chapter 552 of the Texas Government Code, and as such is required to release information in accordance with the provisions of the Public Information Act.

If bidder considers any of its submitted information to be proprietary in nature, trade secret, or otherwise confidential, then it must clearly and conspicuously mark such information as proprietary, trade, secret, or confidential. By the submission of its bid, Bidder expressly affirms that it has clearly and conspicuously marked any information within its submission that Bidder considers confidential, proprietary, and/or trade secret.

In the event the County receives a request for information under the Public Information Act seeking information that the Bidder has marked as confidential, proprietary, and /or trade secret, then the County agrees that it shall provide notice to the Bidder of the request for information and the request for decision process under the Public Information Act. Thus, the County will submit the initial correspondence to the Texas Attorney General – however, the burden is and shall be on the Bidder to submit correspondence to the Attorney General if the Bidder wishes its information to be withheld. Bidder is deemed to have knowledge of the Public Information Act. **By the submission of its bid, bidder expressly acknowledges that the burden to withhold its' information from public disclosure lays with the bidder;** thus, bidder further acknowledges and agrees that it shall submit comments to the Texas Attorney General in the request for decision process if bidder wishes to have its' information withheld from public disclosure.

21. BIDDER'S E-MAIL ADDRESSES – CONSENT TO DISCLOSURE

Notwithstanding the foregoing Section 19, Bidder acknowledges and agrees that the confidentiality of any and all email addresses Bidder uses or discloses in communicating with the County are **open** to the public in accordance with Section 552.137 of the Government Code and Bidder consents to the release of its email addresses.

22. RESULTANT CONTRACT

Bidder shall correctly and fully execute the resultant contract first. After this, the contract shall be set for consideration by the Commissioners' Court. If the Commissioners' Court authorizes the execution of the contract, the resultant contract shall become effective upon the Commissioners' Court execution of same, provided that the contract is executed by all parties to the contract. Contract documents shall consist of the contract, the General and Special Provisions, drawings, bid package (including best and final offer(s) if such is utilized), any addenda issued, and any change orders issued during the work. If applicable to the attached bid, bidder must sign three (3) original contracts and return all three with their bid submittal.

Bidder should submit a proposed contract with its Bid or its sample material terms and conditions for review and consideration.

23. CONTRACT TERM

The term of the resultant contract will begin on the date of full execution or the execution by the Commissioners' Court, whichever is later, and will terminate on the date specified in the resultant contract unless terminated earlier as herein set forth.

24. TERMINATION FOR DEFAULT

Failure of either party in the performance of any of the provisions of this contract shall constitute a breach of contract, in which case either party may require corrective action within ten (10) business days from date of receipt of written notice citing the exact nature of such breach. Failure of the party being notified to take corrective action within the

prescribed ten (10) business days, or failure to provide written reply of why no breach has occurred, shall constitute a Default of Contract.

All notices relating to default by Bidder of the provisions of the contract shall be issued by the County through its Legal Department, and all replies shall be made in writing to the County Legal Department. Notices issued by or issued to anyone other than the County Legal Department shall be null and void and shall be considered as not having been issued or received.

Galveston County reserves the right to enforce the performance of this contract in any manner prescribed by law in the event of breach or default of this contract, and may contract with another party, with or without solicitation of bids or further negotiations. At a minimum, Bidder shall be required to pay any difference in service or materials, should it become necessary to contract with another source, plus reasonable administrative costs and attorney fees.

In the event of Termination for Default, Galveston County, its agents or representatives shall not be liable for loss of any profits anticipated to be made by Bidder.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

No waiver by either party of any event of default under this agreement shall operate as a waiver of any subsequent default under the terms of this agreement.

County reserves the right to terminate this contract immediately in the event Bidder:

- A. Fails to meet delivery or completion schedules; and/or
- B. Fails to otherwise perform in accordance with the accepted Bid and the contract.

25. TERMINATION FOR CONVENIENCE

County may terminate this contract upon at least thirty (30) calendar days prior written notice for its convenience or for any reason deemed by the County to serve the public interest. As well, County may terminate this contract upon thirty (30) calendar days prior written notice for any reason resulting from any governmental law, order, ordinance, regulation, or court order. In no event shall County be liable for loss of any profits anticipated to be made hereunder by Bidder should this contract be terminated early.

26. FORCE MAJEURE

If by reason of Force Majeure either Party shall be rendered unable, wholly or in part, to carry out its responsibilities under this contract by any occurrence by reason of Force Majeure, then the Party unable to carry out its responsibility shall give the other Party notice and full particulars of such Force Majeure in writing within a reasonable time after the occurrence of the event, and such notice shall suspend the Party's responsibility for the continuance of the Force Majeure claimed, but for no longer period.

Force Majeure means acts of God, floods, hurricanes, tropical storms, tornadoes, earthquakes, or other natural disasters, acts of a public enemy, acts of terrorism, sovereign conduct, riots, civil commotion, strikes or lockouts, and other causes that are not occasioned by either Party's conduct which by the exercise of due diligence the Party is unable to overcome and which substantially interferes with operations.

27. ESTIMATED QUANTITIES

Any reference to quantities shown in the Invitation to Bid is an estimate only. Since the exact quantities cannot be predetermined, the County reserves the right to adjust quantities as deemed necessary to meet its requirements.

28. CONTRACTOR INVESTIGATION

Before submitting a bid, each Bidder shall make all investigations and examinations necessary to ascertain all site conditions and requirements affecting the full performance of the contract and to verify any representations made by the County upon which the contractor will rely. Bidder shall exercise due diligence and is further charged with knowledge of the local, State, and Federal laws, rules, and regulations applicable to this contract. If the bidder receives an award as a result of its bid submission in this procurement, the bidder's failure to have made such investigations and examinations will in no way relieve the bidder from its obligation to comply in every detail with all provisions and requirements of the contract, nor will a plea of ignorance of such conditions and requirements be accepted as a basis for any claim whatsoever by the contractor for additional compensation and/or for excused nonperformance.

29. NO COMMITMENT BY COUNTY OF GALVESTON

This Invitation to Bid does not commit the County of Galveston to award any costs or pay any costs, or to award any contract, or to pay any costs associated with or incurred in the preparation of a bid in response to this Invitation to Bid and does not commit the County of Galveston to procure or contract for services or supplies.

30. BID COSTS BORNE BY BIDDER

Galveston County shall not be liable for any costs incurred by Bidder in preparation, production, or submission of a bid, including but not limited to best and final offer if applicable. As well, Galveston County shall not be liable for any work performed by Bidder prior to issuance of fully executed contract and properly issued notice to proceed. Galveston County shall not be liable for any costs incurred by Bidder by reason of attending a pre-Bid conference. Galveston County shall not be liable for any costs incurred by Bidder by reason of the County invoking use of best and final offers.

31. BEST AND FINAL OFFIERS (BAFO)

Not applicable.

32. SINGLE BID RESPONSE

If only one bid is received in response to the Invitation to Bid, a detailed cost bid may be requested of the single bidder. A cost/price analysis and evaluation and/or audit may be performed of the cost bid in order to determine if the price is fair and reasonable.

33. CHANGES IN SPECIFICATIONS

If it becomes necessary to revise any part of this bid, a written notice of such revision will be provided to all Bidders in the form of addenda. The County is not bound by any oral representations, clarifications, or changes made in the written specifications by the County's employees or officials, unless such clarification or change is provided to

Bidders in a written addendum from the Purchasing Agent. Bidders are advised to inquire prior to the submission deadline as to whether any addenda to this invitation to bid have been issued, as the successful bidder will be required to abide by such addenda.

The County of Galveston reserves the right to revise or amend the specifications up to the time set for opening of bids. Such revisions and amendments, if any, shall be announced by form of addenda. Copies of such addenda (or addendum in the event only one addendum is issued in the procurement) shall be furnished to all prospective contractors. Prospective contractors are defined as those contractors listed on the County's Invitation to Bid list for this material/service or those who have obtained documents from the Purchasing Agent's Office subsequent to the advertisement. If revisions and amendments require changes in quantities or prices proposed, or both, the date set for opening of bids may be postponed by such number of days as in the opinion of the County shall enable contractors to revise their bids. In any case, the bid opening shall be at least seven (7) business days after the last revising or amendment addendum and the addendum shall include an announcement of the new date, if applicable, for the opening of bids.

34. BID IDEAS AND CONCEPTS

The County reserves to itself the right to adopt or use for its benefit, any concept, plan, or idea contained in any bid.

35. BID DISCLOSURES

While this procurement is pending, the names of those who submitted bids will not be made public unless in conformity with the County Purchasing Act. Likewise, no pricing or staffing information will be released unless in conformity with the County Purchasing Act. Bidders are requested to withhold all inquiries regarding their bid or other submissions until after an award is made. No communication is to be had with any County employee or official, other than the County Purchasing Agent, regarding whether a bid was received - violations of this provision may result in the rejection of a bid.

36. INDEMNIFICATION

The contractor agrees to assume all risks and responsibility for, and agrees to indemnify, defend, and save harmless, the County of Galveston, its elected and appointed officials and department heads, agents and employees from and against all claims, demands, suits, actions, recoveries, judgments, and costs and expenses including reasonable attorney's fees for the defense thereof arising out of or in connection therewith on account of the loss of life, property or injury or damage to the person which shall arise from contractor's operations under this contract, its use of County facilities and/or equipment or from any other breach on the part of the contractor, its employees, agents or any person(s), in or about the County's facilities with the expressed or implied consent of the County. Contractor shall pay any judgment with cost which may be obtained against Galveston County resulting from contractor's operations under this contract.

Contractor agrees to indemnify and hold the County harmless from all claims of subcontractors, laborers incurred in the performance of this contract. Contractor shall furnish satisfactory evidence that all obligations of this nature herein above designated have been paid, discharged or waived. If Contractor fails to do so, then the County reserves the right to pay unpaid bills of which County has written notice direct and withhold from Contractor's unpaid compensation a sum of money reasonably sufficient to liquidate any and all such lawful claims.

37. REQUIREMENT OF AND PROOF OF INSURANCE

The successful Bidder shall furnish evidence of insurance to the County Purchasing Agent and shall maintain such insurance as required hereunder or as may be required in the Special Provisions or resultant contract, if different. Contractor shall obtain and thereafter continuously maintain in full force and effect, commercial general liability insurance, including but not limited to bodily injury, property damage, and contractual liability, with combined single limits as listed below or as may be required by State or Federal law, whichever is greater.

- A. For damages arising out of bodily injury to or death of one person in any one accident :
ONE HUNDRED THOUSAND AND NO/100 (\$100,000.00) DOLLARS.
- B. For damages arising out of bodily injury to or death of two or more persons in any one accident:
THREE HUNDRED THOUSAND AND NO/100 (\$300,000.00) DOLLARS.
- C. For any injury to or destruction of property in any one accident :
ONE HUNDRED THOUSAND AND NO/100 (\$100,000.00) DOLLARS.

Insurance shall be placed with insurers having an A.M. Best's rating of no less than A. Such insurance must be issued by a casualty company authorized to do business in the State of Texas, and in standard form approved by the Board of Insurance Commissioners of the State of Texas, with coverage provisions insuring the public from loss or damage that may arise to any person or property by reason of services rendered by Contractor.

Galveston County shall be listed as the additional insured on policy certificates and shall be provided with no less than thirty (30) calendar days prior notice of any changes to the policy during the contractual period.

Certificates of Insurance, fully executed by a licensed representative of the insurance company written or countersigned by an authorized Texas state agency, shall be filed with the County Purchasing Agent within ten (10) business days of issuance of notification from the County Purchasing Agent to Bidder that the contract is being activated as written proof of such insurance and further provided that Bidder shall not commence work under this contract until it has obtained all insurance required herein, provided written proof as required herein, and received written notice to proceed issued from the County Purchasing Agent.

Proof of renewal/replacement coverage shall be provided prior to the expiration, termination, or cancellation date of any policy and Galveston County shall be named as an additional insured on any such renewal/replacement coverage and a certificate of insurance showing such shall be provided to the Purchasing Agent. Said insurance shall not be cancelled, permitted to expire, or changed without at least thirty (30) days prior written notice to the County.

Insurance required herein shall be maintained in full force and effect during the life of this contract and shall be issued on an occurrence basis. Contractor shall require that any and all subcontractors that are not protected under the Contractor's own insurance policies take and maintain insurance of the same nature and in the same amounts as required of Contractor and provide written proof of such insurance to Contractor. Proof of renewed/replacement coverage shall be provided prior to the expiration, termination, or cancellation date of any policy. Contractor shall not allow any subcontractor to commence work on the subcontract until such insurance required for the subcontractor has been obtained and approved.

Workers' Compensation Insurance: Successful Bidder shall carry in full force Workers' Compensation Insurance Policy(ies), if there is more than one employee, for all its' employees, including but not limited to full time, part time, and emergency employees employed by the successful Bidder. Current insurance certificates certifying that such policies as specified above are in full force and effect shall be furnished by successful Bidder to the County.

Insurance is to be placed with insurers having a Best rating of no less than A. The Bidder shall furnish the County with certificates of insurance and original endorsements affecting coverage required by these insurance clauses within

ten (10) business days of receiving notification from the County Purchasing Agent that the contract is being activated. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf. The Bidder shall be required to submit annual renewals for the term of this contract prior to expiration of any policy.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

The County agrees to provide Bidder with reasonable and timely notice of any claim, demand, or cause of action made or brought against the County arising out of or related to utilization of the property. Bidder shall have the right to defend any such claim, demand, or cause of action at its sole cost and expense and within its sole and exclusive discretion. The County agrees not to compromise or settle any claim or cause of action arising out of or related to the utilization of the property without the prior written consent of the Bidder.

In no event shall the County be liable for any damage to or destruction of any property belonging to the Bidder.

Subrogation Waiver. Bidder and Bidder's insurance carrier waive any and all rights to subrogation against Galveston County in regard to any suit or claim arising out of personal injury or property damage resulting from Bidder's performance under this agreement.

38. BID GUARANTEE

Unless specified differently within the Special Provisions of this procurement, each Bidder shall be required to submit a bid guarantee with its bid as required within this Section.

Evidencing its firm commitment to engage in contract if Bidder is selected for award of contract, each Bidder is required to furnish with their bid a cashier's check or an acceptable Bidder's bond in the amount of five percent (5%) of the total contract price. If Bidder is using a bond, then the Bidder bond must be executed with a surety company authorized to do business in the State of Texas. Failure to furnish the bid guarantee in the proper form and amount, by the time set for opening of bids may be cause for rejection of the bid.

The cashier's check or Bidder/bid bond (as applicable) will be returned to each respective unsuccessful Bidder(s) subsequent to the Commissioners Court award of contract, and shall be returned to the successful Bidder upon the completion and submission of all contract documents. Provided however, that the cashier's check or Bidder bond will be forfeited to the County as liquidated damages should successful Bidder fail to execute the contract within thirty (30) days after receiving notice of the acceptance of its bid.

39. PERFORMANCE AND PAYMENT BONDS (if required)

Successful Bidder, before beginning work, shall execute a performance bond and a payment bond, each of which must be in the amount of the contract. The required payment and performance bonds must each be executed by a corporate surety authorized to write surety bonds in the State of Texas and in accordance with Chapter 3503 of the Insurance Code (codified in 2005 and originally within Section 1, Chapter 87, Acts of the 56th Leg., R.S., 1959, and in Article 7.19-1, Vernon's Texas Insurance Code).

The performance and payment bonds must each clearly and prominently display on the bond or on an attachment to the bond:

- a.) The name, mailing address, physical address, and telephone number, including the area code, of the surety company to which any notice of claim should be sent; or
- b.) The toll-free telephone number maintained by the Texas Department of Insurance under Subchapter B, Chapter

521, Insurance Code, and a statement that the address of the surety company to which any notice of claim should be sent may be obtained from the Texas Department of Insurance by calling the toll free-telephone number.

The performance bond shall be solely for the protection of Galveston County, in the full amount of the contract, and conditioned on the faithful performance of the work in accordance with the plans, specifications, and contract documents. The payment bond is solely for the protection and use of payment bond beneficiaries who have a direct contractual relationship with the prime contractor or a subcontractor to supply labor or material, and in the amount of the contract.

The payment and performance bonds required to be furnished herein must be furnished before the contractor begins work and are a requirement for issuance of a Notice to Proceed. Such bonds must be furnished to the Galveston County Purchasing Agent within thirty (30) calendar days after the date of the full execution of the contract or, if applicable, as required under Chapter 2253, Government Code, whichever is earlier. Contractor's failure to provide the required payment and performance bonds within such time period shall constitute an event of default under this contract. Contractor shall not commence work until all applicable certificates of insurance, performance bonds, and payment bonds have been received and approved by the County Purchasing Agent and the Contractor receives notice to proceed in writing that has been issued by the County Purchasing Agent.

Additionally, if this request for bid is for the award of a public works contract, then compliance with Chapter 2253 of the Texas Government Code, which is known as the McGregor Act, is mandatory. Performance and payment bonds are required to be furnished in accordance with Chapter 2253 of the Texas Government Code. Bidder should familiarize itself with the entire provisions of Chapter 2253 of the Texas Government Code.

40. PATENT AND COPYRIGHT PROTECTION

The Bidder agrees at its sole expense to protect the County from claims involving infringement of patents, copyright, trademark, trade secret, or other intellectual property rights. **Bidder shall indemnify and save harmless the County of Galveston, its officers, employees, and agents, from liability of any nature and kind whatsoever, including without limitation cost and expenses, for or on account of any copyrighted, trademarked, trade secret, patented or un-patented invention, process, or article manufactured or used in the performance of the contract, or other intellectual property rights, including its use by the County.** Bidder also agrees that if Bidder is awarded this contract, that no work performed hereunder shall be subject to patent, copyright, or other intellectual property by Bidder.

41. CONFLICT OF INTEREST DISCLOSURE REPORTING (FORM CIQ)

Bidder may be required under Chapter 176 of the Texas Local Government Code to complete and file a conflict of interest questionnaire (CIQ Form). The CIQ Form pertains to business relationship, gift giving and family relationship reporting. If bidder is required to file a CIQ Form, then the completed CIQ Form must be filed with the County Clerk of Galveston County, Texas.

Business relationship. If Bidder has an employment or other business relationship with a local government officer of Galveston County or with a family member of a local government officer of Galveston County that results in the officer or family member of the officer receiving taxable income that exceeds \$2,500.00 during the preceding 12-month period, then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

Gift-giving. If Bidder has given a local government officer of Galveston County or a family member of a local government officer of Galveston County one or more gifts with an aggregate value of more than one-hundred dollars

(\$100.00) during the preceding 12-months, then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

Family member. For purposes of the business relationship and gift giving reporting requirements, a “family member” means a person related to another person with the first degree of consanguinity or affinity, as described by Subchapter B, Chapter 573, Texas Government Code. Examples of persons within the first degree by consanguinity or affinity include a son, daughter, father, mother, spouse, son-in-law, daughter-in-law, father-in-law, mother-in-law, stepson, stepdaughter, stepmother, and stepfather.

Family relationship. If Bidder has a “family relationship” with a local government officer of Galveston County then Bidder **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County, regardless of whether Bidder has a business relationship or has given gifts to the local government officer or a family member of the local government officer. For this purpose, “family relationship” means Bidder is related within the third degree by consanguinity or the second degree by affinity, as those terms are defined under Chapter 573 of the Texas Government Code, to a local government officer of Galveston County. Examples of such relationships include a son, daughter, mother, father, brother, sister, grandchild, great-grandchild, grandparent, great-grandparent, niece, nephew, uncle, aunt, spouse, mother-in-law, father-in-law, daughter-in-law, son-in-law, spouse’s grandchild, spouse’s grandparent, grandparent’s spouse, grandchild’s spouse, stepson, stepdaughter, stepmother, and stepfather.

Bidder must file its original CIQ Form with the Galveston County Clerk. The Galveston County Clerk has offices at the following locations:

Galveston County Clerk

Galveston County Justice Center, Suite 2001
600 59th Street
Galveston, Texas 77551

Galveston County Clerk

North County Annex, 1st Floor
174 Calder Road
League City, Texas 77573

Again, if Bidder is required to file a CIQ Form, the original completed form is filed with the Galveston County Clerk (**not the Purchasing Agent**).

For Bidder’s convenience, a blank CIQ Form is enclosed with this bid package. Blank CIQ Form(s) may also be obtained by visiting the Purchasing Agent’s website – this website is linked from the Galveston County homepage, at <http://www.galvestoncountytexas.gov>.

Chapter 176 specifies deadlines for the filing of CIQ Forms (both initial filings and updated filings).

It is Bidder’s sole responsibility to file a true and complete CIQ Form with the Galveston County Clerk if Bidder is required to file by the requirements of Chapter 176 of the Local Government Code. Bidder is advised that it is an offense to fail to comply with the disclosure reporting requirements dictated under Chapter 176 of the Texas Local Government Code, and the failure to file may be grounds to void the contract, if Bidder is awarded a contract.

If Bidder has any questions about compliance with Chapter 176, Bidder may wish to consult its’ legal counsel. Compliance is the individual responsibility of each person, business, and agent who is subject to Chapter 176 of the Texas Local Government Code.

42. DISCLOSURE OF INTERESTED PARTIES/FORM 1295

Under Section 2252.908 of the Government Code, any business entity that enters into a contract with Galveston County that requires the approval of the Commissioners Court must submit a “Disclosure of Interested Parties” to the County prior to the execution of the contract. This form, the “Disclosure of Interested Parties” form was promulgated by the Texas Ethics Commission, and is the “Form 1295”. **This procurement is subject to these requirements.**

The Texas Ethics Commission was charged with promulgating rules to implement Section 2252.908 of the Government Code. The rules adopted by the Texas Ethics Commission are located at Sections 46.1, 46.3, and 46.5 of Title 1 of the Texas Administrative Code. Thus, the law covering these requirements is located at Section 2252.908 of the Government Code, and in Title 1, Sections 46.1, 46.3, and 46.5 of the Texas Administrative Code.

The Texas Ethics Commission’s website is: www.ethics.state.tx.us. The area of the Texas Ethics Commission website pertaining to Form 1295 is:

www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm.

Form 1295 must be completed electronically through the Texas Ethics Commission website (handwritten forms are not allowable). Once the business entity has completed their electronic filing of Form 1295, then the business entity must print out the electronically completed form, and sign and notarize the Form 1295. Once Form 1295 is signed and notarized, the business entity must submit their completed, signed, and notarized Form 1295 to the Galveston County Purchasing Agent.

Successful Proposer is and shall be subject to these requirements, and no resultant contract may be executed by the Commissioners Court until the completed, signed, and notarized Form 1295 is on file with the County Purchasing Agent.

No portion of the Form 1295 process commits the County to any type of award of contract whatsoever.

After the Purchasing Agent’s Office receives the completed, signed, and notarized Form 1295, the Purchasing Agent’s Office will, within 30 days, go the Texas Ethics Commission website to submit electronic confirmation of the County’s receipt of the completed, signed, and notarized Form 1295.

43. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS & REQUIREMENT TO REGISTER IN SAM

Bidder certifies that neither it, nor any of its Principals, are presently debarred, suspended, proposed for debarment, disqualified, excluded, or in any way declared ineligible for the award of contracts by any Federal agency. Contractor agrees that it shall refund Galveston County for any payments made to Contractor while ineligible. Contractor acknowledges that Contractor’s uncured failure to perform under this Agreement, if such should occur, may result in Contractor being debarred from performing additional work for the County, the respecting State Agency administering the grant funding the contract, if applicable, the State, FEMA or HUD (as applicable), and other Federal and State entities. Further, Bidder has executed the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters and returned the fully completed and executed original certification with the submission of its bid. **The truthful and fully completed and executed original of the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters must be included with the submission of Bidder’s Bid and is a mandatory requirement of this Invitation to Bid. Bidder’s failure to include the fully completed and executed original of this Certification shall be considered non-compliance with the requirements of this Invitation to Bid and grounds for the rejection of Bidder’s Bid.** Proposer shall immediately notify the County Purchasing Agent if it becomes debarred or suspended, placed on the Consolidated List of Debarred

Contractors, or in any other way becomes ineligible for award of contract by any Federal agency. This Certification is a material fact relied upon by Galveston County; if it is later determined that the contractor did not comply with 2 C.F.R. Part 180 and 2 C.F.R. Part 3000, in addition to the remedies available to Galveston County and the State agency administering this grant, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment of contractor.

If the contract to be awarded pursuant to this procurement involves the use of Federal funds, then bidder must also be registered in the Federal Contractor Registry through the System for Award Management (SAM) to be eligible for award of contract pursuant to this procurement.

Information regarding the SAM is available at:

<http://www.federalcontractorregistry.com/?gclid=CIG1hf2rr8wCFYkCaQoducANZw> or at <https://www.sam.gov/portal/SAM/#1>.

No contract involving the use of Federal funds may be awarded to any bidder unless and until such registration is current and in good standing under SAM. Successful bidder must maintain SAM registration throughout the entire term of the agreement with the County. If this contract involves the use of Federal funds, then bidder must enclose proof of such SAM registration within its response, which is also a mandatory requirement of this procurement; failure to enclose such proof shall be considered non-compliance with the requirements of this procurement and grounds for the rejection of bidder's response to this procurement (i.e., bid, proposal, or qualifications statement, as applicable).

44. SOVEREIGN IMMUNITY

The County specifically reserves any claim it may have to sovereign, qualified, or official immunity as a defense to any action arising in conjunction with this contract.

45. CONTROLLING LAW AND VENUE

Bidder acknowledges and agrees that the contract is and shall be governed and construed by the laws of the State of Texas and that venue shall lie exclusively in a court of competent jurisdiction in Galveston County, Texas.

46. MERGERS, ACQUISITIONS

The Bidder shall be required to notify the County of any potential for merger or acquisition of which there is knowledge at the time that a bid is submitted.

If subsequent to the award of any contract resulting from this Invitation to Bid the Bidder shall merge or be acquired by another firm, the following documents must be submitted to the County:

- A. Corporate resolutions prepared by the awarded Bidder and the new entity ratifying acceptance of the original contract, terms, conditions and prices;
- B. New entity's Federal Identification Number (FEIN);
- C. New entity's proposed operating plans;
- D. New entity's proof of registration in SAM for contracts involving Federal funds;
- E. New entity's certification regarding debarment;

- F. New entity's certification regarding lobbying; and
- G. W-9 Form for new entity.

Moreover, Bidder is required to provide the County with notice of any anticipated merger or acquisition as soon as Bidder has actual knowledge of the anticipated merger or acquisition. The New Bidder's proposed plan of operation must be submitted prior to merger to allow time for submission of such plan to the Commissioners Court for its approval.

47. DELAYS

The County reserves the right to delay the scheduled commencement date of the contract if it is to the advantage of the County. There shall be no additional costs attributed to these delays should any occur. Bidder agrees it will make no claims for damages, for damages for lost revenues, for damages caused by breach of contract with third parties, or any other claim by Bidder attributed to these delays, should any occur. In addition, Bidder agrees that any contract it enters into with any third party in anticipation of the commencement of the contract will contain a statement that the third party will similarly make no claim for damages based on delay of the scheduled commencement date of the contract.

48. ACCURACY OF DATA

Information and data provided through this Invitation to Bid are believed to be reasonably accurate.

49. SUBCONTRACTING/ASSIGNMENT

Bidder shall not assign, sell, or otherwise transfer its contract in whole or in part without prior written permission of the County acting by and through its Commissioners' Court. Such consent, if granted, shall not relieve the Bidder of any of its responsibilities under this contract.

50. INDEPENDENT CONTRACTOR

Bidder expressly acknowledges that it is an independent contractor. Nothing in this agreement is intended nor shall be construed to create an agency relationship, an employer/employee relationship, a joint venture relationship, or any other relationship allowing County to exercise control or direction over the manner or method by which Bidder or its subcontractors perform in providing the requirements stated in the Invitation to Bid.

51. MONITORING PERFORMANCE

The County shall have the unfettered right to monitor and audit the Bidder's work in every respect. In this regard, the Bidder shall provide its full cooperation and insure the cooperation of its employees, agents, assigns, and subcontractors. Further, the Bidder shall make available for inspection and/or copying when requested, original data, records, and accounts relating to the Bidder's work and performance under this contract. In the event any such material is not held by the Bidder in its original form, a true copy shall be provided.

52. SUBJECT TO APPROPRIATION OF FUNDS

State law prohibits the obligation and expenditure of public funds beyond the fiscal year for which a budget has been approved by the Commissioners' Court. Galveston County anticipates this to be an integral part of future budgets to be approved during the periods of this contract, except for unanticipated needs or events which may prevent such payments against this contract. However, Galveston County cannot guarantee the availability of funds, and enters into this contract only to the extent such funds are made available through appropriation (allocation) by the Commissioners' Court. This contract shall not be construed as creating any debt on behalf of the County of Galveston in violation of TEX. CONST. art. XI, § 7, and it is understood that all obligations of Galveston County are subject to the availability of funds.

53. CONTRACTS SUBJECT TO GRANT FUNDING

Notwithstanding the foregoing, if the contract to be awarded by this procurement is funded with Federal or State grant funds, the bidder acknowledges that the obligations of the County under the contract are contingent upon the continued availability of grant funding to meet the County's obligations. If the grant(s) to the County is reduced, de-obligated, or otherwise discontinued or terminated, Contractor agrees that the County may immediately terminate the contract without penalty or any liability whatsoever on the part of the County, the State, or the Federal awarding agency.

54. PROCUREMENT ETHICS

Galveston County is committed to the highest ethical standards. Therefore, it is a serious breach of the public trust to subvert the public purchasing process by directing purchases to certain favored vendors, or to tamper with the competitive bidding process, whether it's done for kickbacks, friendship or any other reason. Since misuse of the purchasing power of a local government carries criminal penalties, and many such misuses are from a lack of clear guidelines about what constitutes an abuse of office, the Code of Ethics outlined below must be strictly followed.

Galveston County also requires ethical conduct from those who do business with the County.

CODE OF ETHICS – Statement of Purchasing Policy:

Public employment is a public trust. It is the policy of Galveston County to promote and balance the objective of protecting the County's integrity and the objective of facilitating the recruitment and retention of personnel needed by Galveston County. Such policy is implemented by prescribing essential standards of ethical conduct without creating unnecessary obstacles to entering public office.

Public employees must discharge their duties impartially so as to assure fair competitive access to governmental procurement by responsible contractors. Moreover, they should conduct themselves in such a manner as to foster public confidence in the integrity of the Galveston County procurement organization.

To achieve the purpose of this Article, it is essential that those doing business with Galveston County also observe the ethical standards prescribed herein.

General Ethical Standards:

It shall be a breach of ethics to attempt to realize personal gain through public employment with Galveston County by any conduct inconsistent with the proper discharge of the employee's duties.

It shall be a breach of ethics to attempt to influence any public employee of Galveston County to breach the standards of ethical conduct set forth in this code.

It shall be a breach of ethics for any employee of Galveston County to participate directly or indirectly in a procurement when the employee knows that:

- The employee or any member of the employee's family, has a financial interest pertaining to the procurement;
- A business or organization in which the employee or any member of the employee's family, has a financial interest pertaining to the procurement; or
- Any other person, business, or organization with which the employee or any member of the employee's family is negotiating or has an arrangement concerning prospective employment is involved in the procurement.

Gratuities:

It shall be a breach of ethics for any person to offer, give, or agree to give any employee or former employee of Galveston County, or for any employee or former employee of Galveston County to solicit, demand, accept or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation of any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy, or other particular matter, pertaining to any program requirement or a contract or subcontract, or to any solicitation or bid pending before this government.

Kickbacks:

It shall be a breach of ethics for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime contractor or higher tier subcontractor for any contract for Galveston County, or to any person associated therewith, as an inducement for the award of a contract, subcontract or order.

Contract Clause:

The prohibition against gratuities and kickbacks prescribed above shall be conspicuously set forth in every contract and solicitation by Galveston County.

Confidential Information:

It shall be a breach of ethics for any employee or former employee of Galveston County to knowingly use confidential information for actual or anticipated personal gain, or for the actual or anticipated gain of any other person.

Prohibition against Contingent Fees:

It shall be a breach of ethical standards for a person to be retained, or to retain a person, to solicit or secure a Galveston County contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, except for retention of bona fide employees or bona fide established commercial selling agencies for the purpose of securing business. Failure to abide by this section constitutes a breach of ethical standards.

Representation:

Bidder represents and warrants, by signing and submitting its bid, that it has not retained anyone in violation of this section prohibiting contingent fees.

Contract Clause:

The representation prescribed above shall be conspicuously set forth in every contract and solicitation thereof.

55. NON-COLLUSION AFFIDAVIT

Bidder certifies, by signing and submitting a bid, that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the contractor has not directly or indirectly induced or solicited another contractor to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any contractor or anyone else to put in a sham bid or that anyone shall refrain from bidding; that the contractor has not in any manner, directly or indirectly, sought by agreement, communications, or conference with anyone to fix the bid price of the contractor or of any other bidder, or to fix any overhead, profit or cost element of the bid price, or that of any other contractor, or to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the contractor has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any cooperation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

A blank Non-Collusion Affidavit is included with this Bid packet. Bidder must enclose a truthful and fully executed original Non-Collusion Affidavit with the submission of its bid. This is a mandatory requirement of this Invitation to Bid. Failure to include the truthfully and fully executed Non-Collusion Affidavit in the submission of its Bid shall be considered non-compliance with the requirements of this Invitation to Bid by the Bidder and grounds for the rejection of Bidder's submission.

No negotiations, decisions, or actions shall be initiated by any company as a result of any verbal discussion with any County employee prior to the opening of responses to this Invitation to Bid.

No officer or employee of the County of Galveston, and no other public or elected official, or employee, who may exercise any function or responsibilities in the review or approval of this undertaking shall have any personal or financial interest, direct or indirect, in any contract or negotiation process thereof. The above compliance request will be part of all County of Galveston contracts for this service.

56. CERTIFICATION REGARDING LOBBYING

Bidder certifies that:

- a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the bidder, to any person for influencing or attempting to influence a department or employee of an agency, a member of Congress, or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan or cooperative agreement.
- b. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence a department or employee of any agency, a member of Congress, a department or employee of congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the bidder shall complete and submit Standard Form LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions.
- c. Bidder shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

The truthful and fully completed and executed original of the Certification Regarding Lobbying (included with bid packet) must be included with the submission of Bidder's Bid and is a mandatory requirement of this Invitation to Bid. Bidder's failure to include the fully completed and executed or original of this Certification shall be considered

non-compliant with the requirements of this Invitation to Bid and grounds for the rejection of the Bidder's Bid. Submission of the certification is a prerequisite for making or entering into a contract with Bidder and is imposed by Section 1352, Title 31, United States Code. Further, any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

57. NON-DISCRIMINATION

- a. **Equal Employment Opportunity:** Bidder will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, disability, genetic information or veteran status. Bidder will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, national origin, sex, disability, genetic information or veteran status. Such action shall include, but not be limited to, the following: employment; upgrading; demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Bidder agrees to post in conspicuous places, available to employees and applicants for employment, notices of employment.

Bidder will, in all solicitation or advertisements for employees placed by or on behalf of Bidder, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, sex, disability, genetic information, or veteran status.

Bidder will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this Agreement so that such provisions will be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

Bidder will include the provisions herein in every subcontract or purchase order unless exempted.

- b. **Drug Free Work Place Act:** Bidder shall comply with all applicable requirements of the Drug-Free Workplace Act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 U.S.C. § 8102, et seq.) and implementing regulations thereunder.
- c. **Americans with Disabilities Act:** Bidder shall comply with all applicable provisions of the Americans with Disabilities Act of 1990 (Public Law 101-136) and implementing regulations thereunder.
- d. **OSHA Regulations:** Bidder agrees to maintain and to display any applicable materials for its employees in accordance with OSHA regulations.
- e. **Compliance with Immigration Laws and Use of E-Verify:** Bidder agrees to comply with all requirements of the U.S. Immigration Reform and Control Act of 1986, as amended, and any implementing regulations thereto. Bidder further agrees to utilize the E-Verify system through the Department of Homeland Security on its employees. Bidder shall not employ unauthorized aliens, and shall not assign services to be performed to any supplier or subcontractor who are unauthorized aliens. If any personnel performing any services hereunder are discovered to be an unauthorized alien, then Bidder will immediately remove such personnel from performing services hereunder and shall replace such personnel with personnel who are not unauthorized alien(s).
- f. **State and Federal Law Compliance:** Bidder agrees to comply with all other State and Federal laws and regulations applicable to the provision of services under this contract.

58. RECORD RETENTION AND RIGHT TO AUDIT

Bidder shall keep and maintain all records associated with this contract for a minimum of five (5) years from the close of the contract or as required by Federal or State law or regulation, whichever period is longer. If awarded this contract, Bidder shall allow the County reasonable access to the records in Bidder's possession, custody, or control that the County deems necessary to assist it in auditing the services, costs, and payments provided hereunder. If this contract involves the use of Federal or State funds, then Bidder shall also allow reasonable access to representatives of the Office of Inspector General, the General Accounting Office, the State Auditor's Office, and the other Federal and/or State agencies overseeing the funds that such entities deem necessary to facilitate review by such agencies and Bidder shall maintain fiscal records and supporting documentation for all expenditures in a manner that conforms with OMB Circular A-87 (relocated to 2 C.F.R. Part 225) and this contract.

59. TITLE VI ASSURANCES/TxDOT

The County is subject to Title VI of the Civil Rights Act of 1964 and the Federal and State laws and regulations of the United States Department of Transportation and Texas Department of Transportation (TxDOT). Pursuant to these requirements, the County must have its contractors provide required assurances on compliance with non-discrimination by itself and its subcontractors. The Title VI Assurances within this Subsection are not exhaustive – whenever any Federal, State, or Local requirement requires additional clauses, this list shall not be construed as limiting. Contractor agrees as follows:

- (1) Compliance with Regulations:** The Contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, DOT) Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are incorporated herein by reference and made a part of this contract.
- (2) Non-discrimination:** The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the basis of race, color, national origin, religion, sex, age, disability or Veteran status in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.
- (3) Solicitations for Subcontractors, Including Procurement of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurement of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, national origin, religion, sex, age, disability or Veteran status.
- (4) Information and Reports:** The Contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the Galveston County or the Texas Department of Transportation to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of the Contractor is in the exclusive possession of another who fails or refuses to furnish this information the Contractor shall so certify to Galveston County or the Texas Department of Transportation as appropriate, and shall set forth what efforts it has made to obtain the information.
- (5) Sanctions for Non-compliance:** In the event of the Contractor's noncompliance with the nondiscrimination provisions of this contract, Galveston County shall impose such contract sanctions as it or the Texas Department of Transportation may determine to be appropriate, including, but not limited to:

- (a) withholding of payments to the Contractor under the contract until the Contractor complies, and/or;
- (b) cancellation, termination, or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions. The Contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as Galveston County or the Texas Department of Transportation may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Contractor may request Galveston County to enter into such litigation to protect the interests of Galveston County, and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

60. SECTION 231.006, FAMILY CODE/DELINQUENT CHILD SUPPORT

Pursuant to Title 5, Section 231.006 of the Texas Family Code, as applicable, Bidder certifies that it, including all of its principals, is/are current in child support payments and that it is eligible to receive payments from State funds under a contract for property, materials, or services. Bidder acknowledges and agrees that if it is awarded this contract, then the ensuing agreement may be terminated and payment withheld if this certification is inaccurate. Finally, by the submission of its bid, the Bidder certifies that it has included the names and social security numbers of each person with at least 25% ownership interest in Bidder within its response to the Invitation to Bid and that all such persons are current in child support payments.

61. ANTITRUST

Pursuant to 15 U.S.C. § 1, et seq., and Texas Business and Commerce Code, Chapter 15, Contractor, by the submission of its bid, certifies that neither Contractor nor any natural person, proprietorship, firm, corporation, partnership, association, or institution represented by Contractor or anyone acting for such natural person, proprietorship, firm, corporation, partnership, association, or institution has violated any Federal or State antitrust laws or communicated the nature of the offer, directly or indirectly, to any competitor or other person engaged in a similar line of business.

62. LABOR STANDARDS

On contracts funded under a federal grant: Bidder acknowledges that the contract to be awarded pursuant to this solicitation is on a grant program funded with Federal funds. Bidder shall comply with the requirements of 29 CFR Part 5 and Part 30 and shall be in conformity with Executive Order 11246, entitled "Equal Employment Opportunity", Copeland, "Anti-Kickback" Act (40 U.S.C. 3145, 29 C.F.R. Part 3), the Davis-Bacon and Related Acts (40 U.S.C. 3141-3148, 29 C.F.R. Parts 1,3, and 5), the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 et seq.), and all other applicable Federal, State, and local laws and regulations pertaining to labor standards, insofar as those acts apply to the performance of this Agreement. Bidder is also responsible for ensuring that all subcontractors comply with the requirements of 29 CFR Part 5 and Part 30 and shall be in conformity with Executive Order 11246, entitled "Equal Employment Opportunity", Copeland "Anti-Kickback" Act, the Davis-Bacon and Related Acts (29 CFR Parts 1, 3 and 5), the Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 et seq.), and all other applicable Federal, State, and local laws and regulations pertaining to labor standards, insofar as those acts apply to the performance of this Agreement.

63. PROCUREMENT LAWS

- a. Bidder shall comply with all applicable local, State, and Federal procurement laws, rules, and regulations.
- b. If this contract is made pursuant to a federal award, then Contractor acknowledges that the contract is subject, without limitation, to applicable provisions within 2 C.F.R. Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. Contractor shall comply with applicable provisions within 2 C.F.R., Sections 200.319 through 200.326, including but not limited to the following:
 - 1.) **Equal Employment Opportunity**, 41 C.F.R. Part 60-1.4(b) (applicable to federally assisted construction contracts).
 - (a) During the performance of this contract, the contractor agrees as follows:
 - (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national original, disability, or veteran status. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, national original, disability or veteran status. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
 - (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national original, disability, or veteran status.
 - (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
 - (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and by rules, regulations, and relevant orders of the Secretary of Labor.
 - (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to contractor's books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
 - (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
 - (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The

contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

- 2.) **Small and minority business, women’s business enterprises, and labor surplus area firms (2 C.F.R. § 200.321).** The County is required to take affirmative steps to assure that minority businesses, women’s business enterprises, and labor surplus area firms are used when possible. This includes requiring the prime contractor, if subcontracts are to be let in the performance of this contract, to itself take affirmative steps in letting the subcontract. Accordingly, if subcontracts are to be let in the performance of this contract, the contractor must take affirmative steps in the letting of the subcontract(s), which must include:
- (a) placing qualified small and minority businesses and women’s business enterprises on solicitation lists;
 - (b) assuring that small and minority businesses, and women’s business enterprises are solicited whenever they are potential sources;
 - (c) dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women’s business enterprises; and
 - (d) using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

In accordance with FEMA procurement guidance:

A small business is a business that is independently owned and operated, not dominant in the field of operation in which it is bidding on Galveston County contracts, and qualified as a small business under the Small Business Administration criteria and size standards at 13 C.F.R. Part 121.

A women’s business enterprise is a business enterprise that is: (a) at least 51 percent owned by one or more women or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more women; and (b) whose management and daily operations are controlled by one or more women.

A minority business is a business that is (a) at least 51 percent owned by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more minority group members; and (b) whose management and daily operations are controlled by one or more minority group members.

- 3.) **Davis-Bacon Act as amended (40 U.S.C. 3141-3148).** When required by Federal program legislation, all prime construction contracts in excess of \$2,000 must include a provision for compliance with the Davis-Bacon Act as supplemented by the Department of Labor regulations (29 C.F.R. Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractor must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity (the County) must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be condition upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contract must also include a provision for compliance with the Copeland Anti-Kickback Act (40 U.S.C. § 3145) as supplemented by the Department of Labor regulations (29 C.F.R. Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”).

4.) **Compliance with the Copeland “Anti-Kickback” Act.** Contractor is prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which the person is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. “Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined under this title [Title 18, U.S.C.] or imprisoned not more than five years, or both.” 18 U.S.C. § 874.

- (a) Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. Part 3 as may be applicable, which are incorporated by reference into this contract.
- (b) The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as the Federal awarding agency may be appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.
- (c) Breach. A breach of the contract clause above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.

5.) **Contract Work Hours and Safety Standards Act.**

(a) Where applicable, all contracts awarded by the County in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704, as supplemented by the Department of Labor regulations at 29 C.F.R. Part 5. Under 40 U.S.C. 3702 of the Contract Work Hours and Safety Standards Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.S. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchase of supplies or material or articles ordinarily available on the open market, or contractors for transportation or transmission of intelligence.

(b) Compliance with the Contract Work Hours and Safety Standards Act.

- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this subsection the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this subsection, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard work week of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this subsection.

- (3) Withholding for unpaid wages and liquidated damages. The awarding Federal agency, State agency, or the County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this subsection.
- (4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this subsection and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this subsection.

6.) Rights to Inventions Made Under a Contractor Agreement.

- (a) If the Federal award meets the definition of “funding agreement” under 37 C.F.R. § 401.2(a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under the “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 C.F.R. Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.
- (b) Stafford Act Disaster Grants. This requirement does not apply to Public Assistance, Hazard Mitigation Grant Program, Crisis Counseling Assistance and Training Grant program, Disaster Case Management Grant Program, and Federal Assistance to Individuals and Households – Other Needs Assistance Grant Program, as FEMA awards under these programs do not meet the definition of “funding agreement.”
- (c) The regulations and 37 C.F.R. § 401.2(a) currently defines “funding agreement” as any contract, grant, or cooperative agreement entered into between any Federal agency, other than the Tennessee Valley Authority, and any contractor for the performance of experimental, developmental, or research work funded in whole or in part by the Federal government. This term also includes any assignment, substitution of parties, or subcontract of any type entered into for the performance of experimental, developmental, or research work under a funding agreement as defined in the first sentence of this paragraph.

7.) Clean Air Act (42 U.S.C. §§ 7401 – 7671q) and the Federal Water Pollution Control Act 33 U.S.C. §§ 1251-1387), as amended.

- (a) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401, et seq., and agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Contract Act, as amended, 33 U.S. C. § 1251, et seq.
- (b) The contractor agrees to report each violation of the Clean Air Act and/or the Federal Water Pollution Control Act to the Federal awarding agency, the State agency administering the grant, and the Regional Office of the Environmental Protection Agency (EPA) and understands and agrees that the Federal awarding agency, the State agency, and the EPA will, in turn, report each violation as required to assure notification to Galveston County, the Federal Emergency Management Agency, and the appropriate EPA Regional Office.

- 8.) **Debarment and Suspension (Executive Orders 12549 and 12689).** A contract award must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. Part 180 that implement Executive Orders 12549 and 12689. The Contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

Contractor must comply with 2 C.F.R. Part 180, Subpart C and 2 C.F.R. Part 3000, Subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into. Bidder agrees to comply with the requirements of 2 C.F.R. Part 180, Subpart C, and 2 C.F.R. Part 3000, Subpart C, while this offer is valid and through the period of any contract that may arise from this offer. The bidder further agrees to include a provision requiring such compliance in its lower tier covered transactions.

9.) **Procurement of Recovered Materials.**

- (a.) A non-Federal entity that is a State agency or agency of a political subdivision of the State and its contractors must comply with Section 6002 of the Solid Waste Disposal Act, Public Law No. 89-272 (1965) (codified as amended by the Resource Conservation and Recovery Act at 42 U.S.C. § 6962).
- (b.) In the performance of this contract, the contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—
- (1) Competitively within a timeframe providing for compliance with the contract performance schedule;
 - (2) Meeting contract performance requirements; or
 - (3) At a reasonable price.
- (c.) Information about this requirement is available at EPA's Comprehensive Procurement Guidelines website, <http://www.epa.gov/cpg/>. The list of EPA-designated items is available at <https://www.epa.gov/cpg/products.htm>.

In the event of any discrepancy between the provisions in this Section 61 of General Provisions and provisions on the same subject elsewhere within this procurement, the most stringent shall control.

64. ENTIRETY OF AGREEMENT AND MODIFICATION

This contract contains the entire agreement between the parties. Any prior agreement, promise, negotiation or representation not expressly set forth in this contract has no force or effect. Any subsequent modification to this contract must be in writing, signed by both parties.

An official representative, employee, or agent of the County does not have the authority to modify or amend this contract except pursuant to specific authority to do so granted by the Galveston County Commissioners' Court.

65. NOTICE

All notices or other communications required or permitted under this contract shall be in writing and shall be deemed to have been duly given if delivered personally in hand, transmitted by facsimile, or mailed certified mail, return receipt requested with proper postage affixed and addressed to the appropriate party at the following address or at such other address as may have been previously given in writing to the parties (Bidder shall provide its notice information with its Bid submission). If mailed, the notice shall be deemed delivered when actually received, or if

earlier, on the third day following deposit in a United States Postal Service post office or receptacle, duly certified, return receipt requested, with proper postage affixed. If delivered in person, notice shall be deemed delivered when receipted for by, or actually received by, the receiving Party. If transmitted by facsimile, notice shall be deemed delivered when receipt of such transmission is acknowledged.

To the County at:

Hon. Mark Henry,
County Judge of Galveston County
722 Moody (21st Street), Second (2nd) Floor
Galveston, Texas 77550
Fax: (409) 765-2653

With copies to:

Rufus Crowder, CPPO CPPB,
Galveston County Purchasing Agent
722 Moody (21st Street), Fifth (5th) Floor
Galveston, Texas 77550
Fax: (409) 621-7997

To the Contractor at:

(Bidder to provide its contact name, address, and facsimile number for notice under the contract.)

66. USE OF DHS SEAL, LOGO, AND FLAGS PROHIBITED WITHOUT PRIOR APROVAL

Contractor must obtain permission from the U.S. Department of Homeland Security financial assistance office (DHS FAO) **prior** to using DHS seals(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials, including use of the United States Coast Guard seal, logo, crests or reproductions of flags or likenesses of Coast Guard Officials.

67. FEDERAL GOVERNMENT NOT A PARTY

Contractor acknowledges that the Federal Government is not a party to the contract and is not subject to any obligations or liabilities to Galveston County, contractor, or any other party pertaining to any matter resulting from the contract.

68. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS

In contracts funded through Federal grants, Contractor acknowledges that 31 U.S.C. Chapter 38, Administrative Remedies for False Claims and Statements (31 U.S.C. § 3801, et seq.) and the implementing regulations thereunder, 49 C.F.R. Part 79, apply to Contractors actions pertaining to the contract.

69. LEAD AND ASBESTOS

If this invitation to bid involves remediation, demolition, reconstruction, rehabilitation, repair, or construction, or other applicable activities, the Contractor shall be responsible for performing investigations of lead and asbestos containing materials, and any required lead and asbestos abatement in compliance with Federal, State, and local laws, rules, regulations, ordinances and orders, relating to lead abatement and asbestos abatement as applicable, including but not limited to the Texas Asbestos Health Protection Act, codified as Chapter 1954 of the Occupations Code; the Texas Asbestos Health Protection Regulations, located at Title 25, Part 1, Chapter 295, Subchapter C of the Texas Administrative Code; Chapter 1955 of the Texas Occupations Code (lead-based paint abatement); the Texas Environmental Lead Reduction regulations, located at Title 25, Part 1, Chapter 295, Subchapter I of the Texas Administrative Code; the federal National Emission Standards for Asbestos regulations, located at Title 40, Part 61, Subpart M of the Code of Federal Regulations, and the National Emission Standards for Hazardous Air Pollutants. Contractor shall perform such inspections, encapsulation, remediation or other actions as required by federal, State, or local requirements in accordance with the federal Environmental Protection Agency (EPA), Texas Department of State Health Services (TXDSHS), and Texas Commission on Environmental Quality (TCEQ) requirements.

70. ACKNOWLEDGMENT OF GOVERNMENT RECORD

Bidder acknowledges that its submission in this Invitation to Bid, including its response, bid, certifications, affidavits, Vendor Forms (i.e., PEID, W-9, CIQ, etc.) constitutes government records under Chapter 37 of the Texas Penal Code.

71. COMPLIANCE WITH GALVESTON COUNTY PURCHASING POLICIES AND PROCEDURES

Bidder acknowledges, by its submission in this Invitation to Bid, that it shall comply with the Galveston County Purchasing Policies & Procedures Manual approved by Order of the Galveston County Commissioners Court on March 7, 2018.

End of General Provisions Section

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The Special Provisions and the General Provisions of this Invitation to Bid and the Exhibits attached hereto are made a part of this agreement between the Parties. In the event of a conflict between the General Provisions and the Special Provisions, the terms of the Special Provisions shall control.

A. PURPOSE

Galveston County is seeking a vendor for construction of a four-lane, divided, major thoroughfare consisting of paving, sidewalks, storm sewer, water line and sanitary sewer. The limits are from Stoney Lake Drive SE to approximately 1,500 feet north of West Blvd. in Friendswood, TX.

The construction cost estimate to complete this project is \$6,800,000.00.

B. DEFINITIONS (As mentioned in FAR Subpart 52.2—Text of Provisions and Clauses)

52.202-1 Definitions.

Definitions (Nov 2013)

When a solicitation provision or contract clause uses a word or term that is defined in the Federal Acquisition Regulation (FAR), the word or term has the same meaning as the definition in FAR [2.101](#) in effect at the time the solicitation was issued, unless—

- (a) The solicitation, or amended solicitation, provides a different definition;
- (b) The contracting parties agree to a different definition;
- (c) The part, subpart, or section of the FAR where the provision or clause is prescribed provides a different meaning; or
- (d) The word or term is defined in FAR [Part 31](#), for use in the cost principles and procedures

C. BID SURETY

A Bid surety/bond is a requirement of this solicitation.

D. PERFORMANCE AND PAYMENT BONDS

Performance and Payment Bonds are a requirement of this solicitation.

E. DAVIS-BACON WAGE RATES

Attention is called to the fact that not less than, the federally determined prevailing (Davis-Bacon and Related Acts) wage rate, as issued by the Office of Rural Community Affairs and contained in the contract documents, must be paid on this project. In addition, the successful bidder must ensure that employees and applicants for employment are not discriminated against because of race, color, religion, sex age or national origin.

F. BEST AND FINAL OFFERS (BAFO)

The Best and Final Offer process **is not applicable** to this solicitation.

G. PROCUREMENT TIMELINE

A timeline for this Bid and initial process is included below. Galveston County reserves the right to change these dates and will notify Bidders of any changes:

Advertise BID (first date of publication)	Thursday, June 11, 2020
Advertise BID (second date of publication)	Thursday, June 18, 2020
Pre-Bid Conference video/tele-conference	Tuesday, June 23, 2020 at 10:00 a.m.
Deadline for Questions & Inquiries	Friday, June 26, 2020 by 5:00
Bids due from public/Bid Opening	Thursday, July 9, 2020 at 2:00 p.m.

H. PRE-BID CONFERENCE

A non-mandatory pre-bid conference will be held on Tuesday, June 23, 2020 at 10:00 a.m.

Due to the COVID-19 pandemic, the County of Galveston has instituted measures to guard against the spread of the virus. This includes the prohibition of in-person meetings, social distancing, and stay-at-home requirements for employees.

The Pre-Bid Conference shall take place via video/tele-conference and the instructions are listed below and on the County’s Purchasing website:

Minimum System Requirements for Video Conferencing:

1. High-resolution webcam;
2. Computer processing minimum: 2 GB of RAM and a quad-core processor;
3. Network bandwidth: 1 Mbps is sufficient for 15 fps at 720p resolution;

Calling from a mobile device:

1. Front facing camera;
2. In ear headphone with built in mic

Instructions for Video Conferencing:

1. [Click here](https://guest.lifesize.com/1907077) or navigate to <https://guest.lifesize.com/1907077>
2. Enter Name and email (optional);
3. Click the Terms of Service and Privacy Policy checkbox;
4. Click Join Meeting

***Note - be sure to enable audio and video.**

I. PERSONNEL TO CONTACT

Bidders desiring an explanation or interpretation relative to this solicitation must request it in writing. Oral explanations or instructions will not be binding. Any information given to a Bidder, which in the opinion of the County affects all responders or would be prejudicial to other Bidders if not communicated, shall be furnished to all Bidders as an addendum to the solicitation. Bidders **must** direct all inquiries to the following:

Rufus G. Crowder, CPPO CPPB
Purchasing Agent
722 21st Street (Moody)
Galveston, Texas 77550
e-mail: purchasing.bids@co.galveston.tx.us

Bidders must e-mail their requests (with the subject line “**Friendswood Lakes Blvd. – Bid# B201029– Questions**”) for additional information and/or clarification to the address listed above. The request must include the Bidder’s name and the BID number and title. *Any request for additional information or*

clarification must be received in writing no later than seven (7) calendar days prior to the Bid due date.

Late requests or those not delivered to the proper address may not receive a reply. Bidders shall not attempt to contact the County by any other means. The Purchasing Agent's Office shall post the answers to the County website from the procurement web page and via addendum.

The County will issue responses to inquiries and any other corrections or amendments, it deems necessary, in the form of a written addendum, issued prior to the Bid Submission Date. The County, at its sole discretion, may not issue a response to a RFI submittal. Bidders should not rely on any oral or written representations, statements, or explanations, other than those made in this BID or in any written addendum to this BID. Where there appears to be conflict between the BID and any issued addenda, the last addendum issued will prevail. Addenda will be posted and made available on the County's procurement web page. It is the Bidder's sole responsibility to ensure receipt of all addenda prior to submitting its Bid. All Bidders should check the County's procurement web page for all addenda prior to submitting a response. The County's procurement web page is located at www.galvestoncountytexas.gov/pu/Pages/default.aspx, and current solicitations are at www.galvestoncountytexas.gov/pu/Pages/OpenSolicitations.aspx.

The Bidder must acknowledge the receipt of all addenda on the forms provided. In the event a Bidder fails to acknowledge receipt of such addenda, the County may, at its sole discretion, determine that such failure to acknowledge any or all addenda does not materially affect the Bid and waive the acknowledgement of one or more addenda.

Bidders who submit inquiries *after* the deadline date for receipt of questions indicated on the Procurement Timeline, risk that its response in the procurement will not be responsive or competitive because the County is not able to respond before the Bid receipt date or in sufficient time for the Bidder to prepare a responsive or competitive submittal.

All questions and responses as posted on the County website pertaining to this BID are considered an addendum to, and part of, this BID. Each Bidder shall be responsible to monitor the County website for new or revised BID information. The County shall not be bound by any verbal information nor shall it be bound by any written information that is not either contained within the BID or formally issued as an addendum by the Purchasing Agent's Office.

J. PROGRAM ADMINISTRATION & CONTRACT MANAGEMENT

The Program Administrator/Contract Manager that will manage the work to be performed under the resultant contract for the purpose of this bid is:

Michael Shannon
Galveston County Engineer
722 Moody, (21st St.), 1st Floor
Galveston, TX 77550
(409) 770-5453
Email: michael.shannon@co.galveston.tx.us

K. TYPE OF CONTRACT

It is the intent of this solicitation to enter into a contract that meets federal guidelines. It is imperative that all responders seeking a contract under this solicitation effort must familiarize and adhere to the procurement standards as referenced in 2 C.F.R. Part 200, Sections 200.317-200.326, and Appendix II, 2 C.F.R. Part 200. Sections 200.317-200.326 and Appendix II are attached hereto as **Attachment A**.

The resultant contract consists of the following documents: Invitation to Bid, General Provisions, Special Provisions, General Terms and Conditions (including specifications, drawings, and addenda), Bidder's Bid, Bid Sheets, contract award, and any other documents referenced herein or attached hereto for the work. Collectively these documents may also be referred to as the Plans and Specifications.

In an effort to satisfy cost reasonableness responsibilities at the time of any extension period, the County of Galveston reserves the right to obtain additional quotes and current pricing information from the successful contractor and other contractors to perform the work as stated per the specification listed herein and in the resultant. The solicited results may be used by the County to determine if the contract extensions will be considered or other service options be utilized.

L. COLLATERAL CONTRACT

The County reserves the right to provide by separate contract or otherwise, in such manner as not to delay its programs or damage said Contractor, all labor and material essential to the completion of the work that is not included in this contract.

Award prices include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work. Whenever the Awardee is required or desires to use any design, device, material or process covered by letters of patent or copyright, the Awardee shall indemnify and save harmless the County, its officers, agents and employees from any and all claims for infringement by reason of the use of any such patented design, tool, material, equipment, or process, to be performed under the contract, and shall indemnify the County its officers, agents, and employees for any costs, expenses and damages which may be incurred by reason of any infringement at any time during the prosecution or after the completion of the work.

M. LABOR

Contractor is encouraged to use local labor, but not at the expense of poor workmanship and higher cost. Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. Contractor agrees to post in a conspicuous place a notice setting forth provisions of this non-discrimination clause.

N. INSURANCE

Bidder must submit, with its response, a current certificate of insurance evidencing coverage in the amounts specified below or greater. In lieu of submitting a certificate of insurance, Respondents may submit a notarized statement from an insurance company authorized to conduct business in the State of Texas guaranteeing that Respondent has such insurance. Provided however, that successful Respondent(s) shall be required to provide a current certificate of insurance to the Galveston County Purchasing Agent's Office before Respondent commences any work hereunder. **Insurance shall be placed with insurers having an A.M. Best's rating of no less than A.** Such insurance must be issued by a casualty company authorized to do business in the State of Texas, and in standard form approved by the Board of Insurance Commissioners of the State of Texas, with coverage provisions insuring the public from loss or damage that may arise to any person or property by reason of services rendered by Contractor.

Galveston County shall be listed as an additional insured on each policy and all certificates of insurance and Contractor shall provide Galveston County with no less than thirty (30) calendar days prior notice of any changes to the policy during the contractual period.

Certificates of Insurance, fully executed by a licensed representative of the insurance company written or countersigned by an authorized Texas state agency, shall be filed with the County Purchasing Agent within ten (10) calendar days of the execution of this Agreement as written proof of such insurance and further provided that Contractor shall not commence work under this Agreement until Contractor has obtained all insurance required herein, provided written proof as required herein, and received written notice to proceed issued from the County Purchasing Agent. **Failure to provide such evidence of insurance within the ten (10) calendar day period shall constitute an event of default.**

Workers' Compensation Insurance. Respondent shall carry in full force Workers' Compensation Insurance Policy(ies), if there is more than one employee, for all its employees, including but not limited to full time, part time, and emergency employees employed by the Contractor.

Commercial General Liability. Respondent shall carry in full force commercial general liability insurance with a limit of not less than \$1,000,000 each occurrence and \$2,000,000 in the aggregate. The Policy shall, minimally, cover liability for bodily injury, personal injury, and property damage.

Business Automobile Liability. Respondent shall carry in full force business automobile liability coverage with a combined bodily injury/property damage limit of not less than \$1,000,000 each accident. The policy shall cover liability arising from the operation of licensed vehicles by policyholder.

Professional Liability. Respondent shall carry in full force professional liability insurance with limits of not less than \$1,000,000.00.

Subrogation Waiver. Contractor and Contractor's insurance carrier shall waive any and all rights to subrogation against Galveston County in regard to any suit or claim arising out of personal injury or property damage resulting from Contractor's performance under this Agreement.

O. EXCEPTIONS

Any exceptions to Bid conditions should be listed on a separated sheet of paper, attached to Bid submittals and submitted with Bid at the specified date and time of Bid opening.

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PROCUREMENT STANDARDS

2 C.F.R. §§ 200.317 – 200.326 & 2 C.F.R. PART 200, APPENDIX II

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PROCUREMENT STANDARDS

2 C.F.R. §§ 200.317 – 200.326 & 2 C.F.R. PART 200, APPENDIX II

2 C.F.R. § 200.317. Procurements by states.

When procuring property and services under a Federal award, a state must follow the same policies and procedures it uses for procurements from its non-Federal funds. The state will comply with §200.322 Procurement of recovered materials and ensure that every purchase order or other contract includes any clauses required by section §200.326 Contract provisions. All other non-Federal entities, including sub-recipients of a state, will follow §§ 200.318 General procurement standards through 200.326 Contract provisions.

69 FR 26280, May 11, 2004; 78 FR 78608, Dec. 26, 2013

2 C.F.R. § 200.318. General procurement standards.

(a) The non-Federal entity must use its own documented procurement procedures which reflect applicable State, local and tribal laws and regulations, provided that the procurements conform to applicable Federal law and the standards identified in this part.

(b) Non-Federal entities must maintain oversight to ensure that contractors perform in accordance with the terms, conditions, and specifications of their contracts or purchase orders.

(c)

(1) The non-Federal entity must maintain written standards of conduct covering conflicts of interest and governing the actions of its employees engaged in the selection, award and administration of contracts. No employee, officer, or agent may participate in the selection, award, or administration of a contract supported by a Federal award if he or she has a real or apparent conflict of interest. Such a conflict of interest would arise when the employee, officer, or agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of the parties indicated herein, has a financial or other interest in or a tangible personal benefit from a firm considered for a contract. The officers, employees, and agents of the non-Federal entity may neither solicit nor accept gratuities, favors, or anything of monetary value from contractors or parties to subcontracts. However, non-Federal entities may set standards for situations in which the financial interest is not substantial or the gift is an unsolicited item of nominal value. The standards of conduct must provide for disciplinary actions to be applied for violations of such standards by officers, employees, or agents of the non-Federal entity.

(2) If the non-Federal entity has a parent, affiliate, or subsidiary organization that is not a state, local government, or Indian tribe, the non-Federal entity must also maintain written standards of conduct covering organizational conflicts of interest. Organizational conflicts of interest means that because of

relationships with a parent company, affiliate, or subsidiary organization, the non-Federal entity is unable or appears to be unable to be impartial in conducting a procurement action involving a related organization.

- (d) The non-Federal entity's procedures must avoid acquisition of unnecessary or duplicative items. Consideration should be given to consolidating or breaking out procurements to obtain a more economical purchase. Where appropriate, an analysis will be made of lease versus purchase alternatives, and any other appropriate analysis to determine the most economical approach.
- (e) To foster greater economy and efficiency, and in accordance with efforts to promote cost-effective use of shared services across the Federal Government, the non-Federal entity is encouraged to enter into state and local intergovernmental agreements or inter-entity agreements where appropriate for procurement or use of common or shared goods and services.
- (f) The non-Federal entity is encouraged to use Federal excess and surplus property in lieu of purchasing new equipment and property whenever such use is feasible and reduces project costs.
- (g) The non-Federal entity is encouraged to use value engineering clauses in contracts for construction projects of sufficient size to offer reasonable opportunities for cost reductions. Value engineering is a systematic and creative analysis of each contract item or task to ensure that its essential function is provided at the overall lower cost.
- (h) The non-Federal entity must award contracts only to responsible contractors possessing the ability to perform successfully under the terms and conditions of a proposed procurement. Consideration will be given to such matters as contractor integrity, compliance with public policy, record of past performance, and financial and technical resources. See also § 200.213 Suspension and debarment.
- (i) The non-Federal entity must maintain records sufficient to detail the history of procurement. These records will include, but are not necessarily limited to the following: rationale for the method of procurement, selection of contract type, contractor selection or rejection, and the basis for the contract price.
- (j)
 - (1) The non-Federal entity may use a time and materials type contract only after a determination that no other contract is suitable and if the contract includes a ceiling price that the contractor exceeds at its own risk. Time and materials type contract means a contract whose cost to a non-Federal entity is the sum of:
 - (i) The actual cost of materials; and
 - (ii) Direct labor hours charged at fixed hourly rates that reflect wages, general and administrative expenses, and profit.
 - (2) Since this formula generates an open-ended contract price, a time-and-materials contract provides no positive profit incentive to the contractor for cost control or labor efficiency. Therefore, each contract must set a ceiling price that the contractor exceeds at its own risk. Further, the non-Federal entity awarding such a contract must assert a high degree of oversight in order to obtain reasonable assurance that the contractor is using efficient methods and effective cost controls.

(k) The non-Federal entity alone must be responsible, in accordance with good administrative practice and sound business judgment, for the settlement of all contractual and administrative issues arising out of procurements. These issues include, but are not limited to, source evaluation, protests, disputes, and claims. These standards do not relieve the non-Federal entity of any contractual responsibilities under its contracts. The Federal awarding agency will not substitute its judgment for that of the non-Federal entity unless the matter is primarily a Federal concern. Violations of law will be referred to the local, state, or Federal authority having proper jurisdiction.

78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75885, Dec. 19, 2014; 80 FR 43309, July 22, 2015; 80 FR 45395, July 30, 2015

2 C.F.R. § 200.319. Competition.

(a) All procurement transactions must be conducted in a manner providing full and open competition consistent with the standards of this section. In order to ensure objective contractor performance and eliminate unfair competitive advantage, contractors that develop or draft specifications, requirements, statements of work, or invitations for bids or requests for proposals must be excluded from competing for such procurements. Some of the situations considered to be restrictive of competition include but are not limited to:

- (1) Placing unreasonable requirements on firms in order for them to qualify to do business;
- (2) Requiring unnecessary experience and excessive bonding;
- (3) Noncompetitive pricing practices between firms or between affiliated companies;
- (4) Noncompetitive contracts to consultants that are on retainer contracts;
- (5) Organizational conflicts of interest;
- (6) Specifying only a “brand name” product instead of allowing “an equal” product to be offered and describing the performance or other relevant requirements of the procurement; and
- (7) Any arbitrary action in the procurement process.

(b) The non-Federal entity must conduct procurements in a manner that prohibits the use of statutorily or administratively imposed state, local, or tribal geographical preferences in the evaluation of bids or proposals, except in those cases where applicable Federal statutes expressly mandate or encourage geographic preference. Nothing in this section preempts state licensing laws. When contracting for architectural and engineering (A/E) services, geographic location may be a selection criterion provided its application leaves an appropriate number of qualified firms, given the nature and size of the project, to compete for the contract.

(c) The non-Federal entity must have written procedures for procurement transactions. These procedures must ensure that all solicitations:

- (1) Incorporate a clear and accurate description of the technical requirements for the material, product, or service to be procured. Such description must not, in competitive procurements, contain features which unduly

restrict competition. The description may include a statement of the qualitative nature of the material, product or service to be procured and, when necessary, must set forth those minimum essential characteristics and standards to which it must conform if it is to satisfy its intended use. Detailed product specifications should be avoided if at all possible. When it is impractical or uneconomical to make a clear and accurate description of the technical requirements, a “brand name or equivalent” description may be used as a means to define the performance or other salient requirements of procurement. The specific features of the named brand which must be met by offers must be clearly stated; and

(2) Identify all requirements which the offerors must fulfill and all other factors to be used in evaluating bids or proposals.

(d) The non-Federal entity must ensure that all prequalified lists of persons, firms, or products which are used in acquiring goods and services are current and include enough qualified sources to ensure maximum open and free competition. Also, the non-Federal entity must not preclude potential bidders from qualifying during the solicitation period.

78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75885, Dec. 19, 2014

2 C.F.R. § 200.320. Methods of procurement to be followed.

The non-Federal entity must use one of the following methods of procurement.

(a) Procurement by micro-purchases. Procurement by micro-purchase is the acquisition of supplies or services, the aggregate dollar amount of which does not exceed the micro-purchase threshold (§200.67 Micro-purchase). To the extent practicable, the non-Federal entity must distribute micro-purchases equitably among qualified suppliers. Micro-purchases may be awarded without soliciting competitive quotations if the non-Federal entity considers the price to be reasonable.

(b) Procurement by small purchase procedures. Small purchase procedures are those relatively simple and informal procurement methods for securing services, supplies, or other property that do not cost more than the Simplified Acquisition Threshold. If small purchase procedures are used, price or rate quotations must be obtained from an adequate number of qualified sources.

(c) Procurement by sealed bids (formal advertising). Bids are publicly solicited and a firm fixed price contract (lump sum or unit price) is awarded to the responsible bidder whose bid, conforming with all the material terms and conditions of the invitation for bids, is the lowest in price. The sealed bid method is the preferred method for procuring construction, if the conditions in paragraph (c)(1) of this section apply.

(1) In order for sealed bidding to be feasible, the following conditions should be present:

(i) A complete, adequate, and realistic specification or purchase description is available;

(ii) Two or more responsible bidders are willing and able to compete effectively for the business; and

(iii) The procurement lends itself to a firm fixed price contract and the selection of the successful bidder can be made principally on the basis of price.

(2) If sealed bids are used, the following requirements apply:

(i) Bids must be solicited from an adequate number of known suppliers, providing them sufficient response time prior to the date set for opening the bids, for local, and tribal governments, the invitation for bids must be publicly advertised;

(ii) The invitation for bids, which will include any specifications and pertinent attachments, must define the items or services in order for the bidder to properly respond;

(iii) All bids will be opened at the time and place prescribed in the invitation for bids, and for local and tribal governments, the bids must be opened publicly;

(iv) A firm fixed price contract award will be made in writing to the lowest responsive and responsible bidder. Where specified in bidding documents, factors such as discounts, transportation cost, and life cycle costs must be considered in determining which bid is lowest. Payment discounts will only be used to determine the low bid when prior experience indicates that such discounts are usually taken advantage of; and

(v) Any or all bids may be rejected if there is a sound documented reason.

(d) Procurement by competitive proposals. The technique of competitive proposals is normally conducted with more than one source submitting an offer, and either a fixed price or cost-reimbursement type contract is awarded. It is generally used when conditions are not appropriate for the use of sealed bids. If this method is used, the following requirements apply:

(1) Requests for proposals must be publicized and identify all evaluation factors and their relative importance. Any response to publicized requests for proposals must be considered to the maximum extent practical;

(2) Proposals must be solicited from an adequate number of qualified sources;

(3) The non-Federal entity must have a written method for conducting technical evaluations of the proposals received and for selecting recipients;

(4) Contracts must be awarded to the responsible firm whose proposal is most advantageous to the program, with price and other factors considered; and

(5) The non-Federal entity may use competitive proposal procedures for qualifications-based procurement of architectural/engineering (A/E) professional services whereby competitors' qualifications are evaluated and the most qualified competitor is selected, subject to negotiation of fair and reasonable compensation. The method, where price is not used as a selection factor, can only be used in procurement of A/E professional services. It cannot be used to purchase other types of services though A/E firms are a potential source to perform the proposed effort.

(e) [Reserved]

(f) Procurement by noncompetitive proposals. Procurement by noncompetitive proposals is procurement through solicitation of a proposal from only one source and may be used only when one or more of the following circumstances apply:

- (1) The item is available only from a single source;
- (2) The public exigency or emergency for the requirement will not permit a delay resulting from competitive solicitation;
- (3) The Federal awarding agency or pass-through entity expressly authorizes noncompetitive proposals in response to a written request from the non-Federal entity; or
- (4) After solicitation of a number of sources, competition is determined inadequate.

78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75885, Dec. 19, 2014; 80 FR 54409, Sept. 10, 2015

2 C.F.R. § 200.321. Contracting with small and minority businesses, women's business enterprises, and labor surplus area firms.

- (a) The non-Federal entity must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible.
- (b) Affirmative steps must include:
 - (1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
 - (2) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
 - (3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
 - (4) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
 - (5) Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce; and
 - (6) Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in paragraphs (1) through (5) of this section.

69 FR 26280, May 11, 2004; 78 FR 78608, Dec. 26, 2013, unless otherwise noted

2 C.F.R. § 200.322. Procurement of recovered materials.

A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75885, Dec. 19, 2014

2 C.F.R. § 200.323. Contract cost and price.

(a) The non-Federal entity must perform a cost or price analysis in connection with every procurement action in excess of the Simplified Acquisition Threshold including contract modifications. The method and degree of analysis is dependent on the facts surrounding the particular procurement situation, but as a starting point, the non-Federal entity must make independent estimates before receiving bids or proposals.

(b) The non-Federal entity must negotiate profit as a separate element of the price for each contract in which there is no price competition and in all cases where cost analysis is performed. To establish a fair and reasonable profit, consideration must be given to the complexity of the work to be performed, the risk borne by the contractor, the contractor's investment, the amount of subcontracting, the quality of its record of past performance, and industry profit rates in the surrounding geographical area for similar work.

(c) Costs or prices based on estimated costs for contracts under the Federal award are allowable only to the extent that costs incurred or cost estimates included in negotiated prices would be allowable for the non-Federal entity under Subpart E—Cost Principles of this part. The non-Federal entity may reference its own cost principles that comply with the Federal cost principles.

(d) The cost plus a percentage of cost and percentage of construction cost methods of contracting must not be used.

69 FR 26280, May 11, 2004; 78 FR 78608, Dec. 26, 2013, unless otherwise noted

2 C.F.R. § 200.324. Federal awarding agency or pass-through entity review.

(a) The non-Federal entity must make available, upon request of the Federal awarding agency or pass-through entity, technical specifications on proposed procurements where the Federal awarding agency or pass-through entity believes such review is needed to ensure that the item or service specified is the one being proposed for acquisition. This review generally will take place prior to the time the specification is incorporated into a solicitation document. However, if the non-Federal entity desires to have the review accomplished after a solicitation has been developed, the Federal awarding agency or pass-through entity may still review the specifications, with such review usually limited to the technical aspects of the proposed purchase.

(b) The non-Federal entity must make available upon request, for the Federal awarding agency or pass-through entity pre-procurement review, procurement documents, such as requests for proposals or invitations for bids, or independent cost estimates, when:

(1) The non-Federal entity's procurement procedures or operation fails to comply with the procurement standards in this part;

(2) The procurement is expected to exceed the Simplified Acquisition Threshold and is to be awarded without competition or only one bid or offer is received in response to a solicitation;

(3) The procurement, which is expected to exceed the Simplified Acquisition Threshold, specifies a "brand name" product;

(4) The proposed contract is more than the Simplified Acquisition Threshold and is to be awarded to other than the apparent low bidder under a sealed bid procurement; or

(5) A proposed contract modification changes the scope of a contract or increases the contract amount by more than the Simplified Acquisition Threshold.

(c) The non-Federal entity is exempt from the pre-procurement review in paragraph (b) of this section if the Federal awarding agency or pass-through entity determines that its procurement systems comply with the standards of this part.

(1) The non-Federal entity may request that its procurement system be reviewed by the Federal awarding agency or pass-through entity to determine whether its system meets these standards in order for its system to be certified. Generally, these reviews must occur where there is continuous high-dollar funding, and third party contracts are awarded on a regular basis;

(2) The non-Federal entity may self-certify its procurement system. Such self-certification must not limit the Federal awarding agency's right to survey the system. Under a self-certification procedure, the Federal awarding agency may rely on written assurances from the non-Federal entity that it is complying with these standards. The non-Federal entity must cite specific policies, procedures, regulations, or standards as being in compliance with these requirements and have its system available for review.

69 FR 26280, May 11, 2004; 78 FR 78608, Dec. 26, 2013, unless otherwise noted

2 C.F.R. § 200.325. Bonding requirements.

For construction or facility improvement contracts or subcontracts exceeding the Simplified Acquisition Threshold, the Federal awarding agency or pass-through entity may accept the bonding policy and requirements of the non-Federal entity provided that the Federal awarding agency or pass-through entity has made a determination that the Federal interest is adequately protected. If such a determination has not been made, the minimum requirements must be as follows:

(a) A bid guarantee from each bidder equivalent to five percent of the bid price. The "bid guarantee" must consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified.

(b) A performance bond on the part of the contractor for 100 percent of the contract price. A “performance bond” is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract.

(c) A payment bond on the part of the contractor for 100 percent of the contract price. A “payment bond” is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

69 FR 26280, May 11, 2004; 78FR 78608, Dec. 26, 2013, unless otherwise noted

2 C.F.R. § 200.326. Contract provisions.

The non-Federal entity's contracts must contain the applicable provisions described in Appendix II to Part 200—Contract Provisions for non-Federal Entity Contracts Under Federal Awards.

69 FR 26280, May 11, 2004; 78 FR 78608, Dec. 26, 2013, unless otherwise note

2 C.F.R. Part, 200, Appendix II

In addition to other provisions required by the Federal agency or non-Federal entity, all contracts made by the non-Federal entity under the Federal award must contain provisions covering the following, as applicable.

(A) Contracts for more than the simplified acquisition threshold currently set at \$150,000, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

(B) All contracts in excess of \$10,000 must address termination for cause and for convenience by the non-Federal entity including the manner by which it will be effected and the basis for settlement.

(C) Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of “federally assisted construction contract” in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, “Equal Employment Opportunity” (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, “Amending Executive Order 11246 Relating to Equal Employment Opportunity,” and implementing regulations at 41 CFR part 60, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor.”

(D) Davis-Bacon Act, as amended (40 U.S.C. 3141-3148). When required by Federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

(E) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). Where applicable, all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or

dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

(F) Rights to Inventions Made Under a Contract or Agreement. If the Federal award meets the definition of “funding agreement” under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

(G) Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended—Contracts and subgrants of amounts in excess of \$150,000 must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

(H) Debarment and Suspension (Executive Orders 12549 and 12689)—A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

(I) Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award exceeding \$100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

(J) See §200.322 Procurement of recovered materials.

78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75888, Dec. 19, 2014

CERTIFICATION REGARDING LOBBYING
(31 U.S.C.A. § 1352)
This Certification must be completed, signed, dated and
returned to the Galveston County Purchasing Agent

Procurement Number and Description: _____

_____ BID #B201029, Friendswood Lakes Blvd. _____

Proposer **CERTIFIES**, to the best of its knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the proposer, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the proposer shall complete and submit **Standard Form LLL**, "Disclosure Form to Report Lobbying", in accordance with its instructions.
3. Proposer shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Name of Organization/Corporation: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Signature of Authorized Signatory for Proposer: _____ Date Signed: _____

Title of Authorized Signatory of Proposer: _____

State of Texas

§

§

County of Galveston

§

NON-COLLUSION AFFIDAVIT

Before me, the undersigned notary, on this day personally appeared _____ (Affiant), whom being first duly sworn, deposes and certifies that:

- Affiant is the _____ of _____, that
(Individual, Partner, Corporate Officer) (Name of Qualifier)
submitted the attached Qualification in **Bid No. B201029, Friendswood Lakes Blvd.**
- Affiant is a duly authorized representative of Qualifier and is authorized to make this Non-Collusion Affidavit;
- The attached Qualification is genuine and is not a collusive or sham Qualification;
- The attached Qualification has been independently arrived at without collusion with any other qualifier, bidder, proposer, person, firm, competitor, or potential competitor;
- Qualifier has not colluded, conspired, connived or agreed, directly or indirectly, with any other qualifier, bidder, proposer, person, firm, competitor, or potential competitor, to submit a collusive or sham qualification or that such other qualifier, bidder, proposer, person, firm, competitor, or potential competitor shall refrain from qualifying;
- Qualifier has not in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other qualifier, bidder, proposer, person, firm, competitor, or potential competitor to fix the price or prices in the attached Qualification or of the qualification any other qualifier;
- Qualifier has not in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other qualifier bidder, proposer, person, firm, competitor, or potential competitor to fix the overhead, profit or cost element of the Qualification price or prices of any other qualifier, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against Galveston County or any person interested in the proposed contract;
- Affiant has not in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other qualifier, bidder, proposer, person, firm, competitor, or potential competitor, paid or agreed to pay any other qualifier, bidder, proposer, person, firm, competitor, or potential competitor any money or anything of value in return for assistance in procuring or attempting to procure a contract or in return for establishing the price or prices in the attached Qualification or the qualification of any other Qualifier; and
- Affiant certifies that Affiant is fully informed regarding the accuracy of the statements contained herein, and under penalties of perjury, certifies and affirms the truth of the statements herein, such penalties being applicable to the Qualifier as well as to Affiant signing on its behalf.

Signature of Affiant

SWORN TO and SUBSCRIBED before me this _____ day of _____, 2020.

Notary Public

My Commission Expires: _____

**BID FORM
FRIENDSWOOD LAKES BLVD.
COUNTY OF GALVESTON, TEXAS**

By signing here, the firm does hereby attest that it has fully read the instructions, conditions and general and special provisions and understands them.

THE COMPANY OF: _____

ADDRESS: _____

FEIN (TAX ID): _____

The following shall be returned with your bid. Failure to do so may be ample cause for rejection of bid as non-responsive. It is the responsibility of the Bidder to ensure that bidder has received all addenda.

Items:	Confirmed (X):
1. References (if required)	_____
2. Addenda, if any	#1 _____ #2 _____ #3 _____ #4 _____
3. One (1) original and two (2) copies of submittal	_____
4. Bid Form	_____
5. Vendor Qualification Packet	_____
6. Debarment Certification Form	_____
7. Non-Collusion Affidavit	_____
8. Payment Terms:	_____ net 30 _____ Other
9. Lobbyist Certification	_____
10. Bid Bond	_____

Person to contact regarding this bid: _____

Title: _____ Phone: _____ Fax: _____

E-mail address: _____

Name of person authorized to bind the Firm: _____

Signature: _____ Date: _____

Title: _____ Phone: _____ Fax: _____

E-mail address: _____

**BID FORM
FRIENDSWOOD LAKES BLVD.
GALVESTON COUNTY, TEXAS**

Bidder shall use this form to provide the information for notice.

1. Contact information for notice:

Name: _____
Address: _____

Telephone Number: _____ Facsimile number: _____

2. If a copy of notice is requested, please complete below:

Name: _____
Address: _____

Telephone Number: _____ Facsimile number: _____

3. If second or more copies are requested for notice, please supplement this form and clearly mark the supplement as "Supplementary Notice Information."

Bidder to submit reference information. Bidder shall use this form to provide minimum required reference information. If Bidder wishes to provide more than the minimum, Bidder should supplement this form and should clearly mark the supplement as "Supplementary Reference Information."

1. References who can attest to the Bidder's capability to carry out the requirements set forth in this bid:

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

Business Name of Organization: _____
Name of Person: _____
Title of Individual within Organization, if applicable _____
Business address: _____

Telephone number: _____ Facsimile number: _____

BID FORM
FRIENDSWOOD LAKES BLVD.
GALVESTON COUNTY, TEXAS

References of major supplier of Bidder who can speak to the financial capability of the Bidder to carry out the requirements set forth in this bid:

1. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

2. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

3. Business Name of Supplier _____
Name of Person: _____
Title of Individual within business: _____
Business address: _____

Telephone number: _____ Facsimile number: _____

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County of Galveston
ACKNOWLEDGMENT AND CERTIFICATION REGARDING DEBARMENT,
SUSPENSION, AND OTHER INELGIBILITY
Executive Orders 12549 & 12689 Certification, Debarment and Suspension

Solicitation Number: ITB #B201029

Solicitation Title: Friendswood Lakes Blvd.

Contractor hereby CERTIFIES that:

Contractor, and all of its principals, is not presently debarred, suspended, proposed for debarment, proposed for suspension, or declared ineligible under Executive Order 12549 or Executive Order 12689, Debarment and Suspension, and is not in any other way ineligible for participation in Federal or State assistance programs;

Contractor, and all of its principals, were not and have not been debarred, suspended, proposed for debarment, proposed for suspension, or declared ineligible under Executive Order 12549 or Executive Order 12689, Debarment and Suspension, and were not and have not been in any other way ineligible for participation in Federal or State assistance programs at the time its' proposal was submitted in the procurement identified herein and at any time since submission of its' proposal;

Contractor has included, and shall continue to include, this certification in all contracts between itself and any sub-contractors in connection with services performed under this contract; **and**

Contractor shall notify Galveston County in writing immediately, through written notification to the Galveston County Purchasing Agent, if Contractor is not in compliance with Executive Order 12549 or 12689 during the term of its contract with Galveston County.

Contractor **Represents** and **Warrants** that the individual executing this Acknowledgment and Certification on its behalf has the full power and authority to do so and can legally bind the Contractor hereto.

Name of Business

Date

By: _____
Signature

Printed Name & Title



County of Galveston Purchasing Department Vendor Qualification Packet

(rev. 1.4, September 28, 2017)

All interested parties seeking consideration for qualified vendor status with the County of Galveston should complete and return only the following forms to:

Galveston County Purchasing Department
722 Moody Avenue, (21st Street), 5th Floor
Galveston, Texas 77550
(409) 770-5371 office
(409) 621-7987 fax

PEID Form: Person /Entity Information Data

W -9 Form: Request for Taxpayer Identification Number and Certification
(please note that the included form may not be the latest revised form issued by the Internal Revenue Service. Please check the IRS website at <http://www.irs.gov/pub/irs-rd/ffw9.pdf> for the latest revision of this form.)

CIQ Form: Conflict of Interest Questionnaire
(please note that the included form may not be the latest revised form issued by the State of Texas Ethics Commission. Please check the Texas Ethics Commission website at http://www.ethics.state.tx.us/whatsnew/conflict_forms.htm for the latest revision of this form. Please note that Galveston County Purchasing Agent is not responsible for the filing of this form with the Galveston County Clerk per instructions of the State of Texas Ethics Commission).

Debarment: **CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS & REQUIREMENT TO REGISTER IN SAM**
*Vendors/contractor certifies that neither it, nor any of its Principals, are presently debarred, suspended, proposed for debarment, disqualified, excluded, or in any way declared ineligible for the award of contracts by any Federal agency. Vendor agrees that it shall refund Galveston County for any payments made to Contractor while ineligible. Vendor acknowledges that Contractor's uncured failure to perform under any agreement with the County of Galveston, if such should occur, may result in Contractor being debarred from performing additional work for the County, the respecting State Agency administering the grant funding the contract, if applicable, the State, FEMA or HUD (as applicable), and other Federal and State entities. Further, Vendor has executed the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters and returned the fully completed and executed original certification with the submission of this Vendor Qualification Packet. **The truthful and fully completed and executed original of the Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters must be included with the submission of this Vendor Qualification Packet and is a mandatory requirement to become a vendor of Galveston County. Vendor's failure to include the fully completed and executed original of this Certification shall be considered non-compliant with the requirements of this vendor qualification request and grounds for the rejection of vendor's request. Vendor shall immediately notify the County Purchasing Agent if it becomes debarred or suspended, placed on***

the Consolidated List of Debarred Contractors, or in any other way becomes ineligible for award of contract by any Federal agency. This Certification is a material fact relied upon by Galveston County; if it is later determined that the vendor did not comply with 2 C. F. R. Part 180 and 2 C.F.R. Part 3000, in addition to the remedies available to Galveston County and the State agency administering a grant, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment of contractor. If the contract to be awarded pursuant to a Galveston County procurement effort involves the use of Federal funds, then vendor must also be registered in the Federal Contractor Registry through the System for Award Management (SAM) to be eligible for award of contract pursuant to the procurement.

Information regarding the SAM is available at:

<http://federalcontractorregistry.com/?gclid=CIGlhf2rr8wCFYkCaOoducANZw> or at <http://sam.gov/portal/SAM/#1>.

No contract involving the use of Federal funds may be awarded to any vendor unless and until such registration is current and in good standing under SAM Successful vendors must maintain SAM registration throughout the entire term of any contractual agreement with the County. If a contract involves the use of Federal funds, then vendor must enclose proof of such SAM registration within its response, which is also a mandatory requirement of County procurement policy; failure to enclose such proof shall be considered non-compliant with the requirements of any procurement effort and grounds for the rejection of vendor's response to any procurement efforts (i.e., bid, proposal, or qualifications statement, as applicable).

Direct Deposit: Direct Deposit Authorization Form – Temporarily suspended until further notice

Certificate(s) of Insurance: If the person or entity seeking qualified vendor status with the County will be performing work at or on any County owned facility and/or property, Certificate(s) of Insurance are required to be submitted prior to performing any work.

Insurance requirements are as follows:

Public Liability and Property Damage Insurance:

Successful vendor agrees to keep in full force and effect, a policy of public liability and property damage insurance issued by a casualty company authorized to do business in the State of Texas, and in standard form approved by the Board of Insurance Commissioners of the State of Texas, with coverage provisions insuring the public from any loss or damage that may arise to any person or property by reason of services rendered by vendor. Vendor shall at its own expense be required to carry the following minimum insurance coverages:

1. For damages arising out of bodily injury to or death of one person in anyone occurrence - one hundred thousand and no/100 dollars (\$100,000.00);
2. For damages arising out of bodily injury to or death of two or more persons in anyone occurrence - three hundred thousand and no/100 dollars (\$300,000.00); and
3. For injury to or destruction of property in anyone occurrence - one hundred thousand and no/100 dollars (\$100,000.00).

This insurance shall be either on an occurrence basis or on a claims made basis. Provided however, that if the coverage is on a claims made basis, then the vendor shall be required to purchase, at the termination of this agreement, tail coverage for the County for the period of the County's relationship with the vendor under this agreement. Such coverage shall be in the amounts set forth in subparagraphs (1), (2), and (3) above.

Worker's Compensation Insurance:

Successful vendor shall also carry in full force Workers' Compensation Insurance policy(ies), if there is more than one employee, for all employees, including but not limited to full time, part time, and emergency employees employed by the vendor. Current insurance certificates certifying that such policies as specified above are in full force and effect shall be furnished by the vendor to the County.

The County of Galveston shall be named as additional insured on policies listed in subparagraphs above and shall be notified of any changes to the policy(ies) during the contractual period.

Insurance is to be placed with insurers having a Best rating of no less than A. The vendor shall furnish the County with certificates of insurance and original endorsements affecting coverage required by these insurance clauses. The certificates and endorsements for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf. The vendor shall be required to submit annual renewals for the term of any contractual agreement, purchase order or term contract, with Galveston County prior to expiration of any policy.

In addition to the remedies stated herein, the County has the right to pursue other remedies permitted by law or in equity.

The County agrees to provide vendor with reasonable and timely notice of any claim, demand, or cause of action made or brought against the County arising out of or related to utilization of the property. Vendor shall have the right to defend any such claim, demand, or cause of action at its sole cost and expense and within its sole and exclusive discretion. The County agrees not to compromise or settle any claim or cause of action arising out of or related to the utilization of the property without the prior written consent of the vendor.

In no event shall the County be liable for any damage to or destruction of any property belonging to the vendor unless specified in writing and agreed upon by both parties.

Procurement Policy - Special Note:

Understand that it is, according to Texas Local Government Code, Section 262.011, Purchasing Agents, subsections (d), (e), and (f), the sole responsibility of the Purchasing Agent to supervise all procurement transactions.

Therefore, be advised that all procurement transactions require proper authorization in the form of a Galveston County purchase order from the Purchasing Agent's office prior to commitment to deliver supplies, materials, equipment, including contracts for repair, service, and maintenance agreements. Any commitments made without proper authorization from the Purchasing Agent's office, pending Commissioners' Court approval, may become the sole responsibility of the individual making the commitment including the obligation of payment.

Code of Ethics - Statement of Purchasing Policy:

Public employment is a public trust. It is the policy of Galveston County to promote and balance the objective of protecting the County's integrity and the objective of facilitating the recruitment and retention of personnel needed by Galveston County. Such policy is implemented by prescribing essential standards of ethical conduct without creating unnecessary obstacles to entering public office.

Public employees must discharge their duties impartially so as to assure fair competitive access to governmental procurement by responsible contractors. Moreover, they should conduct themselves in such a manner as to foster public confidence in the integrity of the Galveston County procurement organization.

To achieve the purpose of these instructions, it is essential that those doing business with Galveston County also observe the ethical standards prescribed here.

General Ethical Standards: It shall be a breach of ethics to attempt to realize personal gain through public employment with Galveston County by any conduct inconsistent with the proper discharge of the employee's duties.

It shall be a breach of ethics to attempt to influence any public employee of Galveston County to breach the standards of ethical conduct set forth in this code.

It shall be a breach of ethics for any employee of Galveston County to participate directly or indirectly in procurement when the employee knows that:

- The employee or any member of the employee's immediate family has a financial interest pertaining to the procurement.
- A business or organization in which the employee, or any member of the employee's immediate family, has a financial interest pertaining to the procurement.
- Any other person, business or organization with which the employee or any member of the employee's immediate family is negotiating or has an arrangement concerning prospective employment is involved in the procurement.

Gratuities: It shall be a breach of ethics to offer, give or agree to give any employee of Galveston County, or for any employee or former employee of Galveston County to solicit, demand, accept or agree to accept from another person, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation of any part of a program requirement or purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any program requirement or a contract or subcontract, or to any solicitation or proposal therefore pending before this government.

Kickbacks: It shall be a breach of ethics for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime contractor or higher tier subcontractor for any contract for Galveston County, or any person associated therewith, as an inducement for the award of a subcontract or order.

Contract Clause: The prohibition against gratuities and kickbacks prescribed above shall be conspicuously set forth in every contract and solicitation by Galveston County.

Confidential Information: It shall be a breach of ethics for any employee or former employee of Galveston County to knowingly use confidential information for actual or anticipated personal gain, or for the actual or anticipated gain of any person.

Questions/Concerns:

If you have any questions or concerns regarding the information or instructions contained within this packet, please contact any member of the Purchasing Department staff at **(409) 770-5371**.

CONFLICT OF INTEREST DISCLOSURE REPORTING

Proposer may be required under Chapter 176 of the Texas Local Government Code to complete and file a conflict of interest questionnaire (CIQ Form). If so, the completed CIQ Form must be filed with the County Clerk of Galveston County, Texas.

If Proposer has an employment or other business relationship with an officer of Galveston County or with a family member of an officer of Galveston County that results in the officer or family member of the officer receiving taxable income that exceeds \$2,500.00 during the preceding 12-month period, then Proposer **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County.

If Proposer has given an officer of Galveston County or a family member of an officer of Galveston County one or more gifts with an aggregate value of more than \$250.00 during the preceding 12-months, then Proposer **MUST** complete a CIQ Form and file the original of the CIQ Form with the County Clerk of Galveston County

The Galveston County Clerk has offices at the following locations:

Galveston County Clerk
Galveston County Justice Center, Suite 2001
600 59th Street
Galveston, Texas 77551

Galveston County Clerk
North County Annex, 1st Floor
174 Calder Road
League City, Texas 77573

Again, if Proposer is required to file a CIQ Form, the original completed form is filed with the Galveston County Clerk (not the Purchasing Agent).

For Proposer's convenience, a blank CIQ Form is enclosed with this proposal. Blank CIQ Forms may also be obtained by visiting the Galveston County Clerk's website and/or the Purchasing Agent's website - both of these web sites are linked to the Galveston County homepage at <http://www.galvestoncountytexas.gov>

As well, blank CIQ Forms may be obtained by visiting the Texas Ethics Commission website, specifically at <http://www.ethics.state.tx.us/whatsnew/conflictfroms.htm>

Chapter 176 specifies deadlines for the filing of CIQ Forms (both initial filings and updated filings).

It is Proposer's sole responsibility to file a true and complete CIQ Form with the Galveston County Clerk if Proposer is required to file by the requirements of Chapter 176. Proposer is advised that it is an offense to fail to comply with the disclosure reporting requirements dictated under Chapter 176 of the Texas Local Government Code.

If you have questions about compliance with Chapter 176, please consult your own legal counsel. Compliance is the individual responsibility of each person, business, and agent who is subject to Chapter 176 of the Texas Local Government Code.



COUNTY of GALVESTON

Purchasing Department

rev. 1.3, March 29, 2010

FORM PEID:	Request for Person-Entity Identification Data
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Instructions: Please type or print clearly when completing sections 1 thru 4 and return completed form to:

Galveston County Purchasing Agent
722 Moody Avenue (21 st. Street), 5th Floor
Galveston, Texas 77550
(409) 770-5371
prodoc@co.galveston.tx.us

1.	Business Name:			
	Attention Line:			
2.	Physical Address:			
	City:		State:	Zip+4:
3.	Billing / Remit Address:			
	City:		State:	Zip+4
4.	Main Contact Person:			
	Main Phone Number:			
	Fax Number:			
	E-mail Address:			

Areas below are for County use only.

Requested By:	Phone / Ext. #
Department:	Date:

Action Requested - Check One:	IFAS PEID Vendor Number:	
<input type="checkbox"/> Add New	<input type="checkbox"/> Change Data	<input type="checkbox"/> Re-activate
<input type="checkbox"/> Inactivate	<input type="checkbox"/> Employee	<input type="checkbox"/> Attorney
<input type="checkbox"/> Landlord	<input type="checkbox"/> Foster Parent	<input type="checkbox"/> Refund
<input type="checkbox"/> OneTime	<input type="checkbox"/> Foster Child	

Request for Taxpayer Identification Number and Certification

**Give Form to the
 requester. Do not
 send to the IRS.**

▶ Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type. See Specific Instructions on page 3.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.		
	2 Business name/disregarded entity name, if different from above		
	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes.		4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <i>(Applies to accounts maintained outside the U.S.)</i>
	<input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate		
	<input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.		
	<input type="checkbox"/> Other (see instructions) ▶ _____		
	5 Address (number, street, and apt. or suite no.) See instructions.		Requester's name and address (optional)
6 City, state, and ZIP code			
7 List account number(s) here (optional)			

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number											
				-			-				
or											
Employer identification number											
				-							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person ▶	Date ▶
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting*, later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, *Withholding of Tax on Nonresident Aliens and Foreign Entities*).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the instructions for Part II for details),
3. The IRS tells the requester that you furnished an incorrect TIN,
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code*, later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships*, earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code*, later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or “doing business as” (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity’s name as shown on the entity’s tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a “disregarded entity.” See Regulations section 301.7701-2(c)(2)(iii). Enter the owner’s name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner’s name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity’s name on line 2, “Business name/disregarded entity name.” If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys’ fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

- 1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)
- 2—The United States or any of its agencies or instrumentalities
- 3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities
- 5—A corporation
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission
- 8—A real estate investment trust
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940
- 10—A common trust fund operated by a bank under section 584(a)
- 11—A financial institution
- 12—A middleman known in the investment community as a nominee or custodian
- 13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester*, later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.SSA.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/Businesses and clicking on Employer Identification Number (EIN) under Starting a Business. Go to www.irs.gov/Forms to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to www.irs.gov/OrderForms to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code*, earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983.

You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983.

You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions.

You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor ²
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee ¹
b. So-called trust account that is not a legal or valid trust under state law	The actual owner ¹
6. Sole proprietorship or disregarded entity owned by an individual	The owner ³
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	Give name and EIN of:
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity ⁴
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee

For this type of account:	Give name and EIN of:
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships*, earlier.

*Note: The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes.

Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at spam@uce.gov or report them at www.ftc.gov/complaint. You can contact the FTC at www.ftc.gov/idtheft or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see www.IdentityTheft.gov and Pub. 5027.

Visit www.irs.gov/IdentityTheft to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 1491, 80th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code by a person who has a business relationship as defined by Section 176.001 (1-a) with a local governmental entity and the person meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

A person commits an offense if the person knowingly violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

1 Name of person who has a business relationship with local governmental entity.

2 Check this box if you are filing an update to a previously filed questionnaire.

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 Name of local government officer with whom filer has employment or business relationship.

Name of Officer

This section (item 3 including subparts A, B, C & D) must be completed for each *officer* with whom the filer has an employment or other business relationship as defined by Section 176.001 (1-a), Local Government Code. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the filer of the questionnaire?

Yes

NO

B. Is the filer of the questionnaire receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government *officer* named in this section AND the taxable income is not received from the local governmental entity?

Yes

NO

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an *officer* or director, or holds an ownership of 10 percent or more?

Yes

NO

D. Describe each employment or business relationship with the local government *officer* named in this section.

4

Signature of person doing business with the governmental entity

Date

Adopted 06/29/2007

SPECIAL PROVISIONS FOR CONSTRUCTION

1. Contract and Contract Documents

The Plans, Specifications and Addenda, General Provisions shall form part of this contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth.

2. Definitions

Whenever used in any of the contract Documents, the following meanings shall be given to the terms here in defined:

- (a) The term "Contract" means the Contract executed between the County of Galveston, hereinafter called the Owner, and _____, hereinafter called Contractor, of which these GENERAL CONDITIONS, form a part.
- (b) The term "Project Area" means the area within which are the specified Contract limits of the Improvements contemplated to be constructed in whole or in part under this contract.
- (c) The term "Engineer" means **Terra Associates, Inc.**, Engineer in charge, serving the Owner with architectural or engineering services, his successor, or any other person or persons, employed by the Owner for the purpose of directing or having in charge the work embraced in this Contract.
- (d) The term "Contract Documents" means and shall include the following: Invitation to Bid, , Signed Copy of Bid, General Conditions, Special Provisions For Construction, Acknowledgement and Certification Regarding Debarment, Non-Collusion Affidavit, Vendor Qualification Packet, Payment and Performance Bonds, Contract Award, Addenda (if any), Technical Specifications, and Drawings (as listed in the Schedule of Drawings).
- (e) The term "Substantially Complete" shall mean that the work is fully completed with the exception of minor miscellaneous work and adjustments.

3. Supervision By Contractor

- (a) Except where the Contractor is an individual and gives his personal supervision to the work, the Contractor shall provide a competent superintendent, satisfactory to the Local Public Agency and the Engineer, on the work at all times during working hours with full authority to act for him. The Contractor shall also provide an adequate staff for the proper coordination and expediting of his work.
- (b) The Contractor shall lay out his own work and he shall be responsible for all work executed by him under the Contract. He shall verify all figures and elevations before proceeding with the work and will be held responsible for any error resulting from his failure to do so.

4. Subcontracts

- (a) The Contractor shall not execute an agreement with any subcontractor or permit any subcontractor to perform any work included in this contract until he has verified the subcontractor as eligible to participate in federally funded contracts.
- (b) No proposed subcontractor shall be disapproved by the city/county except for cause.
- (c) The Contractor shall be as fully responsible to the city/county for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them.

- (d) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work and required compliance by each subcontractor with the applicable provisions of the Contract.
- (e) Nothing contained in the Contract shall create any contractual relation between any subcontractor and the Owner.

5. Fitting and Coordination of Work

The Contractor shall be responsible for the proper fitting of all work and for the coordination of the operations of all trades, subcontractors, or material suppliers engaged upon this Contract.

6. Payments to Contractor

(a) Partial Payments

- 1) The Contractor shall prepare his requisition for partial payment as of the last day of the month and submit it, with the required number of copies, to the Engineer for his approval. The amount of the payment due the Contractor shall be determined by adding to the total value of work completed to date, the value of materials properly stored on the site and deducting (1) Five percent (5%) of the total amount, to be retained until final payment and (2) the amount of all previous payments. The total value of work completed to date shall be based on the estimated quantities of work completed and on the unit prices contained in the agreement. The value of materials properly stored on the site shall be based upon the estimated quantities of such materials and the invoice prices. Copies of all invoices shall be available for inspection of the Engineer.
- 2) Monthly or partial payments made by the Owner to the Contractor are moneys advanced for the purpose of assisting the contractor to expedite the work of construction. The Contractor shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the Owner. Such payments shall not constitute a waiver of the right of the Owner to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the Owner in all details.

(b) Final Payment

- 1) After final inspection and acceptance by the Owner of all work under the Contract, the Contractor shall prepare his requisition for final payment which shall be based upon the careful inspection of each item of work at the applicable unit prices stipulated in the Agreement. The total amount of the final payment due the Contractor under this contract shall be the amount computed as described above less all previous payments.
- 2) The Owner before paying the final estimate, shall require the Contractor to furnish releases or receipts from all subcontractors having performed any work and all persons having supplied materials, equipment (installed on the Project) and services to the Contractor, if the Owner deems it necessary in order to protect its interest. The Owner may, if it deems such action advisable, make payment in part or in full to the Contractor without requiring the furnishing of such releases or receipts and any payments made shall in no way impair the obligations of any surety or sureties furnished under this Contract.
- 3) Any amount due the Owner under Liquidated Damages shall be deducted from the final payment due the contractor.

(c) Payments Subject to Submission of Certificates

Each payment to the Contractor by the Owner shall be made subject to submission by the Contractor of all

written certifications required of him and his subcontractors.

(d) **Withholding Payments**

The Owner may withhold from any payment due the Contractor whatever is deemed necessary to protect the Owner, and if so elects, may also withhold any amounts due from the Contractor to any subcontractors or material dealers, for work performed or material furnished by them. The foregoing provisions shall be construed solely for the benefit of the Owner and will not require the Owner to determine or adjust any claims or disputes between the Contractor and his subcontractors or material dealers, or to withhold any moneys for their protection unless the Owner elects to do so. The failure or refusal of the Owner to withhold any moneys from the Contractor shall in no way impair the obligations of any surety or sureties under any bond or bonds furnished under this Contract.

7. Changes in the Work

- (a) The Owner may make changes in the scope of work required to be performed by the Contractor under the Contract without relieving or releasing the Contractor from any of his obligations under the Contract or any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such work shall be executed under the terms of the original Contract unless it is expressly provided otherwise.
- (b) Except for the purpose of affording protection against any emergency endangering health, life, limb or property, the Contractor shall make no change in the materials used or in the specified manner of constructing and/or installing the improvements or supply additional labor, services or materials beyond that actually required for the execution of the Contract, unless in pursuance of a written order from the Owner authorizing the Contractor to proceed with the change. No claim for an adjustment of the Contract Price will be valid unless so ordered.
- (c) If applicable unit prices are contained in the Agreement, the Owner may order the Contractor to proceed with desired unit prices specified in the Contract; provided that in case of a unit price contract the net value of all changes does not increase the original total amount of the agreement by more than twenty-five percent (25%) or decrease the original the total amount by eighteen percent (18%).
- (d) Each change order shall include in its final form:
 - 1) A detailed description of the change in the work.
 - 2) The Contractor's proposal (if any) or a confirmed copy thereof.
 - 3) A definite statement as to the resulting change in the contract price and/or time.
 - 4) The statement that all work involved in the change shall be performed in accordance with contract requirements except as modified by the change order.
 - 5) The procedures as outlined in this Section for a unit price contract also apply in any lump sum contract.

8. Estimated Quantities

This Contract, including the specifications, plans and estimates, is intended to show clearly all the work to be done and material to be furnished hereunder. The estimated quantities of the various classes of work to be done and material to be furnished under this contract are approximate and are to be used as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It is understood and agreed that the actual amount of work to be done and material to be furnished under this contract may differ somewhat

from these estimates, and that the basis for payment under this contract shall be the plan quantity or actual amount of such work done whichever is specified. It is further understood that the County does not guarantee any minimum amount of work under this Contract.

Contractor agrees that it will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this Contract and the estimated quantities contemplated and contained in the proposals.

9. Claims for Extra Cost

- (a) If the Contractor claims that any instructions by Drawings or otherwise involve extra cost or extension of time, he shall, within ten days after the receipt of such instructions, and in any event before proceeding to execute the work, submit his protest thereto in writing to the Owner, stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.
- (b) Claims for additional compensation for extra work, due to alleged errors in ground elevations, contour lines, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material, or performing more work, than would be reasonably estimated from the Drawings and maps issued.
- (c) Any discrepancies which may be discovered between actual conditions and those represented by the Drawings and maps shall be reported at once to the Owner and work shall not proceed except at the Contractor's risk, until written instructions have been received by him from the Owner.
- (d) If, on the basis of the available evidence, the Owner determines that an adjustment of the Contract Price and/or time is justifiable, a change order shall be executed.

10. Time

The Contractor is advised that time for completion will consist of the number of calendar days set out in the Contract Award. The time for completion will begin to run on the day after the issuance of a notice to proceed by the County. The Contractor is required to start work no later than ten (10) working days after the issuance of the written notice to proceed. Failure to timely commence operations may be deemed by the County to be a default. The Contractor will complete the work at that site within the time period specified. If there is more than one site listed on the notice to proceed, work for all sites must be completed not later than is specified for each site.

11. Termination, Delays, and Liquidated Damages

- (a) Right of the Owner to Terminate Contract.

In the event that any of the provisions of this contract are violated by the Contractor, or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the Surety of its intention to terminate the contract. The notices shall contain the reasons for such intention to terminate the contract, and unless such violation or delay shall cease and satisfactory arrangement of correction be made within ten days, the contract shall, upon the expiration of said ten (10) days, cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the Surety and the Contractor. The Surety shall have the right to take over and perform the contract. Provided, however, that if the Surety does not commence performance thereof within ten (10) days from the date of the mailing to such Surety of notice of termination, the Owner may take over the work and complete the project by bid/contract or by force account at the expense of the Contractor and his Surety shall be liable to the Owner for any excess cost incurred. In such event the Owner may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefore.

(b) Liquidated Damages for Delays.

Contractor agrees that time is of the essence of this contract and that for each day of a delay of a day beyond the number of working days or calendar days herein agreed upon the completion of the work herein specified and contracted for (after due allowance for such extension of time as is provided for under Extension of Time hereinabove) County may withhold permanently from Contractor's total compensation the sum of \$1,000.00 for each calendar day of delay, until the work is completed, as liquidated damages for such delay. The Contractor and his sureties shall be liable to the Owner for the amount thereof.

(c) Excusable Delays.

- 1) The right of the Contractor to proceed shall not be terminated nor shall the Contractor be charged with liquidated damages for any delays in the completion of the work due to:
 - a. Any acts of the Government, including controls or restrictions upon or requisitioning of materials, equipment, tools, or labor by reason of war, national defense, or any other national emergency;
 - b. Any acts of the Owner;
 - c. Causes not reasonably foreseeable by the parties to this Contract at the time of the execution of the Contract which are beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God or of the public enemy, acts of another Contractor in the performance of some other contract with the Owner, fires, floods, epidemics, quarantine, restrictions, strikes, freight embargoes, and weather of unusual severity such as hurricanes, tornadoes, cyclones and other extreme weather conditions.
- 2) Provided, however, that the Contractor promptly notifies the Owner within ten (10) days in writing of the cause of the delay. Upon receipt of such notification, the Owner shall ascertain the facts and the cause and extent of delay. If, upon the basis of the facts and the terms of this contract, the delay is properly excusable, the Owner shall extend the time for completing the work for a period of time commensurate with the period of excusable delay.

12. Assignment or Novation

The Contractor shall not assign or transfer, whether by an assignment or novation, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this Contract without the written consent of the Owner; provided, however, that assignments to banks or other financial institutions may be made without the consent of the Owner. No assignment or novation of this Contract shall be valid unless the assignment or novation expressly provides that the assignment of any of the Contractor's rights or benefits under the Contract is subject to a prior lien for labor performed, services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms, or corporations rendering such labor or services or supplying such materials, tools, or equipment.

13. Disputes

- (a) All disputes arising under this Contract or its interpretation except those disputes covered by FEDERAL LABOR STANDARDS PROVISIONS whether involving law or fact or both, or extra work, and all claims for alleged breach of contract shall, within ten (10) days of commencement of the dispute, be presented by the Contractor to the Owner for decision. Any claim not presented within the time limit specified in this paragraph shall be deemed to have been waived, except that if the claim is of a continuing character and notice of the claim is not given within ten (10) days of its commencement, the claim will be considered only for a period commencing ten (10) days prior to the receipt of the Owner.

- (b) The Contractor shall submit in detail his claim and his proof thereof.
- (c) If the Contractor does not agree with any decision of the Owner, he shall in no case allow the dispute to delay the work but shall notify the Owner promptly that he is proceeding with the work under protest.

14. Technical Specifications and Drawings

Anything mentioned in the Technical Specifications and not shown on the Drawings, or vice versa, shall be of like effect as if shown on or mentioned in both. In case of difference between Drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy in Drawings, or Technical Specifications, the matter shall be immediately submitted to the Owner, without whose decision, said discrepancy shall not be adjusted by the Contractor, save only at his own risk and expense.

15. Shop Drawings

- (a) All required shop drawings, machinery details, layout drawings, etc. shall be submitted to the Engineer in copies for approval sufficiently in advance of requirements to afford ample time for checking, including time for correcting, resubmitting and rechecking if necessary. The Contractor may proceed, only at his own risk, with manufacture or installation of any equipment or work covered by said shop drawings, etc. until they are approved and no claim, by the Contractor, for extension of the contract time shall be granted by reason of his failure in this respect.
- (b) Any drawings submitted without the Contractor's stamp of approval will not be considered and will be returned to him for proper resubmission. If any drawings show variations from the requirements of the Contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment of contract price and/or time, otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract even though the drawings have been approved.
- (c) If a shop drawing is in accordance with the contract or involves only a minor adjustment in the interest of the owner not involving a change in contract price or time; the engineer may approve the drawing. The approval shall not relieve the Contractor from his responsibility for adherence to the contract or for any error in the drawing.

16. Requests for Supplementary Information

It shall be the responsibility of the Contractor to make timely requests of the Owner for any additional information not already in his possession which should be furnished by the Owner under the terms of this Contract, and which he will require in the planning and execution of the work. Such requests may be submitted from time to time as the need approaches, but each shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay. Each request shall be in writing, and list the various items and the latest date by which each will be required by the Contractor. The first list shall be submitted within two weeks after Contract award and shall be as complete as possible at that time. The Contractor shall, if requested, furnish promptly any assistance and information the Engineer may require in responding to these requests of the Contractor. The Contractor shall be fully responsible for any delay in his work or to others arising from his failure to comply fully with the provision of this section.

17. Materials and Workmanship

- (a) Unless otherwise specifically provided for in the technical specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose. Where equipment, materials, articles or workmanship are referred to in the technical specifications as "equal to" any particular standard, the Engineer shall decide the question of equality.

- (b) The Contractor shall furnish to the Owner for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required, and shall likewise submit for approval full information concerning all other materials or articles which he proposes to incorporate.
- (c) Machinery, mechanical and other equipment, materials or articles installed or used without such prior approval shall be at the risk of subsequent rejection.
- (d) Materials specified by reference to the number or symbol of a specific standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the Invitation for Bids, except as limited to type, class or grade, or modified in the technical specifications shall have full force and effect as though printed therein.
- (e) The Owner may require the Contractor to dismiss from the work such employee or employees as the Owner or the Engineer may deem incompetent, or careless, or insubordinate.

18. Samples, Certificates and Tests

- (a) The Contractor shall submit all material or equipment samples, certificates, affidavits, etc., as called for in the contract documents or required by the Engineer, promptly after award of the contract and acceptance of the Contractor's bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the Engineer. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time.
- (b) Each sample submitted by the Contractor shall carry a label giving the name of the Contractor, the project for which it is intended, and the name of the producer. The accompanying certificate or letter from the Contractor shall state that the sample complies with contract requirements, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which will assist the Engineer in making a prompt decision regarding the acceptability of the sample. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.
- (c) Approval of any materials shall be general only and shall not constitute a waiver of the Owner's right to demand full compliance with Contract requirements. After actual deliveries, the Engineer will have such check tests made as he deems necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment or accessories which fail to meet check tests have been incorporated in the work, the Engineer will have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by the Contractor as is equitable.
- (d) Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:
 - 1) The Contractor shall furnish without extra cost, including packing and delivery charges, all samples required for testing purposes, except those samples taken on the project by the Engineer;
 - 2) The Contractor shall assume all costs of re-testing materials which fail to meet contract requirements;
 - 3) The Contractor shall assume all costs of testing materials offered in substitution for those found deficient;

- 4) The Owner will pay all other expenses.

19. Permits and Codes

- (a) The Contractor shall give all notices required by and comply with all applicable laws, ordinances, and codes of the Local Government. All construction work and/or utility installations shall comply with all applicable ordinances, and codes including all written waivers. Before installing any work, the Contractor shall examine the drawings and technical specifications for compliance with applicable ordinances and codes and shall immediately report any discrepancy to the Owner. Where the requirements of the drawings and technical specifications fail to comply with such applicable ordinances or codes, the Owner will adjust the Contract by Change Order to conform to such ordinances or codes (unless waivers in writing covering the difference have been granted by the governing body or department) and make appropriate adjustment in the Contract Price or stipulated unit prices.
- (b) Should the Contractor fail to observe the foregoing provisions and proceed with the construction and/or install any utility at variance with any applicable ordinance or code, including any written waivers (notwithstanding the fact that such installation is in compliance with the drawings and technical specifications), the Contractor shall remove such work without cost to the Owner.
- (c) The Contractor shall at his own expense, secure and pay for all permits for street pavement, sidewalks, shed, removal of abandoned water taps, sealing of house connection drains, pavement cuts, buildings, electrical, plumbing, water, gas and sewer permits required by the local regulatory body or any of its agencies.
- (d) The Contractor shall comply with applicable local laws and ordinances governing the disposal of surplus excavation, materials, debris and rubbish on or off the Project Area and commit no trespass on any public or private property in any operation due to or connected with the Improvements contained in this Contract.
- (e) The Contractor will be required to make arrangements for and pay the water, electrical power, or any other utilities required during construction.
- (f) During construction of this project, the Contractor shall use every means possible to control the amount of dust created by construction. Prior to the close of a day's work, the Contractor, if directed by the Owner, shall moisten the bank and surrounding area to prevent a dusty condition.

20. Care of Work

- (a) The Contractor shall be responsible for all damages to person or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance.
- (b) The Contractor shall provide sufficient competent watchmen, both day and night, including Saturdays, Sundays, and holidays, from the time the work is commenced until final completion and acceptance.
- (c) In an emergency affecting the safety of life, limb or property, including adjoining property, the Contractor, without special instructions or authorization from the Owner is authorized to act at his discretion to prevent such threatened loss or injury, and he shall so act. He shall likewise act if instructed to do so by the Owner.
- (d) The Contractor shall avoid damage as a result of his operations to existing sidewalks, streets, curbs, pavements, utilities (except those which are to be replaced or removed), adjoining property, etc., and he shall at his own expense completely repair any damage thereto caused by his operations.
- (e) The Contractor shall shore up, brace, underpin, secure, and protect as maybe necessary, all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be in any

way affected by the excavations or other operations connected with the construction of the improvements included in this Contract. The Contractor shall be responsible for the giving of any and all required notices to any adjoining or adjacent property owner or other party before the commencement of any work. The Contractor shall indemnify and save harmless the Owner from any damages on account of settlements or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the Owner may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

21. Accident Prevention

- (a) No laborer or mechanic employed in the performance of this Contract shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety as determined under construction safety and health standards promulgated by the Secretary of Labor.
- (b) The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work.
- (c) The Contractor shall maintain an accurate record of all cases of death, occupational disease, or injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract. The Contractor shall promptly furnish the Owner with reports concerning these matters.
- (d) The Contractor shall indemnify and save harmless the Owner from any claims for damages resulting from property damage, personal injury and/or death suffered or alleged to have been suffered by any person as a result of any work conducted under this contract.
- (e) The Contractor shall provide trench safety for all excavations more than five feet deep prior to excavation. All OSHA Standards for trench safety must be adhered to by the Contractor.
- (f) The contractor shall at all times conduct his work in such a manner as to insure the least possible inconvenience to vehicular and pedestrian traffic. At the close of the work each day, all streets where possible in the opinion of the Owner, shall be opened to the public in order that persons living in the area may have access to their homes or businesses by the use of the streets. Barricades, warning signs, and necessary lighting shall be provided to the satisfaction of the Owner at the expense of the Contractor.

22. Sanitary Facilities

The Contractor shall furnish, install and maintain ample sanitary facilities for the workmen. As the needs arise, a sufficient number of enclosed temporary toilets shall be conveniently placed as required. Drinking water shall be provided from an approved source, so piped or transported as to keep it safe and fresh and served from single service containers or satisfactory types of sanitary drinking stands or fountains. All such facilities and services shall be furnished in strict accordance with existing and governing health regulations.

23. Use of Premises

- (a) The Contractor shall confine his equipment, storage of materials, and construction operations to the contract limits as shown on the drawings and as prescribed by ordinances or permits, or as may be desired by the Owner, and shall not unreasonably encumber the site or public rights of way with his materials and construction equipment.
- (b) The Contractor shall comply with all reasonable instructions of the Owner and all existing state and local regulations regarding signs, advertising, traffic, fires, explosives, danger signals, and barricades.

24. Removal of Debris, Cleaning, Etc.

The Contractor shall, periodically or as directed during the progress of the work, remove and legally dispose of all surplus excavated material and debris, and keep the Project Area and public rights of way reasonably clear. Upon completion of the work, he shall remove all temporary construction facilities, debris and unused materials provided for work, and put the whole site of the work and public rights of way in a neat and clean condition.

25. Inspection

- (a) All materials and workmanship shall be subject to inspection, examination, or test by the Owner and Engineer at any and all times during manufacture or construction and at any and all places where such manufacture or construction occurs. The Owner shall have the right to reject defective material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the Project Area and replaced with material of specified quality without charge. If the Contractor fails to proceed at once with the correction of rejected workmanship or defective material, the Owner may by contract or otherwise have the defects remedied or rejected materials removed from the Project Area and charge the cost of the same against any Monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.
- (b) The Contractor shall furnish promptly all materials reasonably necessary for any tests which may be required. All tests by the Owner will be performed in such manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the technical specifications.
- (c) The Contractor shall notify the Owner sufficiently in advance of back filling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the Owner, the Contractor shall uncover for inspection and recover such facilities at his own expense, when so requested by the Owner.
- (d) Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to fault of the Contractor or his subcontractors, the Contractor shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, shall be allowed the Contractor and he shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.
- (e) Inspection of materials and appurtenances to be incorporated in the improvements included in this Contract may be made at the place of production, manufacture or shipment, whenever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the technical specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the Project Site.
- (f) Neither inspection, testing, approval nor acceptance of the work in whole or in part, by the Owner or its agents shall relieve the Contractor or his sureties of full responsibility for materials furnished or work performed not in strict accordance with the Contract.

26. Review by Owner

The Owner and its authorized representatives and agents shall have access to and be permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however that all instructions and approval with respect to the work will be given to the Contractor only by the Owner through its authorized representatives or agents.

27. Final Inspection

When the Improvements included in this Contract are substantially completed, the Contractor shall notify the Owner in writing that the work will be ready for final inspection on a definite date which shall be stated in the notice. The Owner will make the arrangements necessary to have final inspection commenced on the date stated in the notice, or as soon thereafter as is practicable.

28. Deduction for Uncorrected Work

If the Owner deems it not expedient to require the Contractor to correct work not done in accordance with the Contract Documents, an equitable deduction from the Contract Price will be made by agreement between the Contractor and the Owner and subject to settlement, in case of dispute, as herein provided.

29. Warranty of Title

No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale, lease-purchase or other agreement by which an interest is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed by him to the Owner free from any claims, liens, or charges. Neither the Contractor nor any person, firm, or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any law permitting such persons to look to funds due the Contractor in the hands of the Owner. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

30. Warranty of Workmanship and Materials

Neither the final certificate of payment nor any provision in the Contract nor partial or entire use of the improvements included in this Contract by the Owner or the public shall constitute an acceptance of work not done in accordance with the Contract or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom which shall appear within a period of 12 months from the date of final acceptance of the work.

31. Job Offices

- (a) The Contractor and his subcontractors may maintain such office and storage facilities on the site as are necessary for the proper conduct of the work. These shall be located so as to cause no interference to any work to be performed on the site. The Owner shall be consulted with regard to locations.
- (b) Upon completion of the improvements, or as directed by the Owner, the Contractors shall remove all such temporary structures and facilities from the site, and leave the site of the work in the condition required by the contract.

32. Partial Use of Site Improvements

The Owner may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected and can be accepted as complying with the technical specifications and if in its opinion, each such section is reasonably safe, fit, and convenient for the use and accommodation for which it was intended, provided:

- (a) The use of such sections of the Improvements shall in no way impede the completion of the remainder of the work by the Contractor.
- (b) The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.
- (c) The period of guarantee stipulated in the Section 29 hereof shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

33. Contract Period

The work to be performed under this contract shall commence within the time stipulated by the Owner in the Notice to Proceed, and shall be fully completed within 270 calendar days thereafter.

34. Keeping Of Plans And Specifications Accessible

The Contractor shall keep one (1) copy of all Plans and Specifications constantly accessible at the work site and available for inspection at all times.

35. Utilities

Contractor shall be responsible for any charges which may be made by any city or utility companies for the work to be performed by Contractor.

36. Parking

Contractor shall be responsible for the expense of parking the Contractor's vehicle(s) in a legal manner and at no expense or inconvenience to the County.

37. Fire And Safety

Contractor is completely responsible for fire protection at the job site as well as the safety of its own employees as well as those entering onto the job site.

38. Contractor's Buildings

The building of structures for housing men, or the erection of tents or other forms of protection will be permitted only at such places as the County shall permit, and the sanitary conditions of the grounds in or about such structures shall at all times be maintained in the manner satisfactory to the County.

39. Worksite Security

Contractor shall maintain the security of the worksite.

Contractor shall provide adequate protection to persons on the worksite, adjacent properties, and utilities as is necessary to keep each free of damage or injury. Contractor shall furnish all barricades, warning lights and other safety devices necessary for the safety and protection of the public and shall remove them upon completion of the work performed on those premises under the terms of this contract.

Contractor will have complete control over the work site and shall be fully responsible for any loss of or damage to any County property from any cause and will reimburse County in the event of any loss or damage to County's property from any cause.

Contractor shall take proper means to protect adjacent or adjoining properties which might be injured or seriously affected by construction undertaken under this Agreement from any damage or injury by reason of said process of construction. Contractor shall be liable for any and all claims for such damage on account of its failure to fully protect all adjoining properties.

40. Final Grading

If grading is required, when work is complete, Contractor shall grade the site to fill in holes and make a presentable appearance without disturbing trees and add fill dirt if needed. Contractor may not leave voids in the grading and compaction of the property. The land shall have a smooth appearance without concrete, bricks, building materials, and other debris on the surface.

41. Changes And Alterations

Contractor further agrees that County may make such changes and alterations as County may see fit, in the line, grade, form dimensions, plans or materials for the work herein contemplated, or any part thereof, either before or after the beginning of the contract construction, without affecting the validity of this Contract and the accompanying bonds.

If such changes or alterations diminish the quantity of the work to be done, they shall not constitute the basis for a claim for damages, or anticipated profits on the work that may be dispensed with. If they increase the amount of the work, and the increased work can fairly be classified under the specifications, such increase shall be paid for according to the quantity actually done and at the unit price established for such work under this contract; otherwise such additional work shall be paid for as provided under the paragraph entitled "EXTRA WORK". In case the County shall make such changes or alterations as shall make useless any work already done or material already furnished or used in said work, then County shall recompense Contractor for any material or labor so used, and for any actual loss occasioned by such change due to actual expenses incurred in preparation for the work as originally planned.

42. Extra Work

The term "Extra Work" as used in this contract shall be understood to mean and include all work that may be required by the County to be done by Contractor to accomplish any change, alteration or addition to the work shown in the plans and specifications.

It is agreed that Contractor shall perform all Extra Work under the direction of the County when presented with a Written Work Order signed by the County. It is also agreed that the compensation to be paid Contractor for performing said Extra Work shall be determined by one or more of the following methods:

Method (a) - By agreed unit prices; or

Method (b) - By agreed lump sum; or

Method (c) - If Neither Method (a) nor Method (b) can be agreed upon before the Extra Work is commenced, then Contractor shall be paid the "Actual field cost" of the work plus fifteen (15) percent.

In the event said Extra Work be performed and paid for under Method (c), then the provisions of this paragraph shall apply and the "actual field cost" is hereby defined to include the cost of all workmen, such as foremen, timekeepers, merchants, and laborers, and materials, supplies, teams, trucks, rentals on machinery and equipment for time actually employed or used on such Extra Work plus actual transportation charges necessarily incurred, if the kind of equipment or machinery is not already on the job, together with all power, fuel, lubricants, water and similar operating expenses, also all necessary incidental expenses incurred directly

on account of such Extra Work including Social Security, Old Age Benefits and other payroll taxes, and a ratable proportion of premiums on Construction and Maintenance Bonds, Public Liability and Property Damage and Workmen's Compensation, and all other insurance as may be required by any law or ordinance. The County may direct the form in which accounts of the "actual field cost" shall be kept and may also specify in writing, before the work commences, the method of doing the work and the type and kind of machinery and equipment to be used, otherwise these matters shall be determined by Contractor. Unless otherwise agreed upon, the prices for the use of machinery and equipment shall be determined by using the one hundred (100) percent of the actual hourly or daily rate (for the time used plus time in moving to and from Job) of the latest schedule of Equipment Ownership Expense adopted by the Association General Contractors of America. Where practicable the terms and prices for the use of Machinery and Equipment shall be incorporated in the Written Extra Work Order. The fifteen (15) percent of the "Actual Field Cost" to be paid Contractor shall cover and compensate him for his profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the 'actual field cost" as herein defined, save that where the Contractor's Camp or Field Office must be maintained primarily on account of such extra work, then the cost to maintain and operate same shall be included in the "actual field cost".

No claim for extra work of any kind will be allowed unless ordered in writing by the County. In case any orders or instructions, either oral or written appear to Contractor to involve extra work for which he should receive compensation, it shall make written request to the County for written order authorizing Extra Work. Should a difference of opinion arise as to what does or does not constitute extra work, or as to the payment therefor, and the County insists upon its performance, Contractor shall proceed with the work after making written order and shall keep an accurate account of the "actual field cost" thereof, as provided under Method (c) and by this action Contractor will thereby preserve the right to submit the matter of payment to litigation.

43. Salvage

Any materials, equipment and fixtures specifically ordered to be salvaged under these specifications shall remain the property of County and will be delivered to the site designated by the County. All other items shall be disposed of by Contractor in compliance with all applicable laws and regulations.

44. Compliance With Codes

Contractor shall comply with all city, county, and state codes, laws, and ordinances in force at the time of award of contract and applicable to such work. Contractor shall obtain, at Contractor's own expense such permits, certificates, and licenses as may be required in the performance of the specified work.

45. Laws And Ordinances

Contractor shall at all times observe and comply with all Federal, State and Local Laws, ordinances and regulations which in any manner effect the contract or the work, and shall indemnify and save harmless the County against any claim arising from the violation of any such laws and ordinances, whether by Contractor or its employees.

46. Permits And Licenses

Contractor shall be responsible for obtaining and furnishing all necessary permits and licenses, City, County, State or Federal as are required for the performance of this contract.

47. Lines And Grades

The Engineer will furnish points for horizontal and vertical control. Any additional stakes required by the Contractor shall be set at his expense. Whenever necessary, work shall be suspended to permit this work, but such suspension will be as brief as practicable and the Contractor shall be allowed no extra compensation therefor. The Contractor shall give the Engineer ample notice of the time and place where control lines and

bench marks will be needed. All control stakes, marks, etc. shall be carefully preserved by the Contractor, and in case of careless destruction or removal by him or his employees, such control stakes, marks, etc. shall be replaced by the Engineer at the Contractor's expense.

48. Excess, Waste Material And Debris

All excess material, waste material and debris shall become the property of the Contractor and shall be properly disposed of off-site. No separate payment shall be made for same.

49. Material Hauling

Hauling of materials will not be paid for directly, but shall be considered as subsidiary work pertaining to the respective bid items. Haul routes for full and empty loads shall be restricted to State Highways. Hauling of equipment is also restricted to State Highways.

50. Abatement And Mitigation Of Excessive Or Unnecessary Construction Noise

Throughout all phases of the construction of this project, including the moving, unloading, operating and handling of construction equipment prior to commencement of work, during the project and after the work is complete, the contractor shall make every reasonable effort to minimize the noise imposed upon the immediate neighborhood surrounding the area of construction. Particular and special efforts shall be exercised by the Contractor to avoid the creation of unnecessary noise impacts on adjacent sensitive receptors in the placement of non-mobile equipment such as air compressors, generators, pumps, etc. The placement of temporary parked mobile equipment with the engine running shall be such as to cause the least disruption of normal adjacent activities not associated with the work to be performed by the contractor.

All equipment associated with the work shall be equipped with components designed by the manufacturer wholly or in part to suppress excessive noise and these components shall be maintained in their original operating condition considering normal depreciation. Noise-attenuation devices installed by the manufacturer such as mufflers, engine covers, insulation, etc., shall not be removed nor rendered ineffectual nor be permitted to remain off the equipment while the equipment is in use.

51. Working Hours

Work shall not be commenced by the contractor before sunrise and shall be so conducted that all equipment is off the road and safely stored by sunset. Specific permission shall be obtained by the contractor from the Engineer for work during those hours between 7:00 P.M. and 6:00 A.M. of the following day.

52. Pipeline, Utility Locations And Contractor Responsibility

An effort to determine all pipelines and utilities which may impact the project has been made. All known pipelines and utilities have been approximately located and shown on the plans. The Contractor shall notify all utility and pipeline owners before beginning the work. Additional unknown utilities and pipelines may be found. Adjustments of these utilities or pipelines shall be done by others at no expense to the contractor. However, the Contractor shall cooperate and coordinate his work with the adjustment

The Contractor will anticipate this in making his bid. The contractor will not be allowed claims for damages or delays for these adjustments should they be necessary. However, additional time will be considered for the contract period.

This action, however, shall in no way be interpreted as relieving the Contractor of his responsibilities under the terms of the contract as set out in the plans and specifications. The Contractor shall repair any damage to the facilities caused by his operations at the Contractor's expense and shall restore facilities to service in a timely manner.

53. Incidentals

All items of work required under this contract not specifically called for in the proposal as pay items shall be considered incidental to the various bid items and no separate payment shall be made for same.

54. Flagmen

During certain phases of construction flagmen will be required to direct and control traffic. This work will not be paid for directly, but shall be considered incidental the various bid items and no separate payment shall be made for same.

55. Field Office

For this project the Contractor will not have to provide a field office.

56. Wage Rates:

The attached schedule of wages per hour for this Contract follows.

"General Decision Number: TX20200038 01/03/2020

Superseded General Decision Number: TX20190038

State: Texas

Construction Type: Highway

Counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Hardin, Harris, Jefferson, Liberty, Montgomery, Orange, San Jacinto and Waller Counties in Texas.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020

* SUTX2011-013 08/10/2011

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER (Paving and Structures).....	\$ 12.98	
ELECTRICIAN.....	\$ 27.11	
FORM BUILDER/FORM SETTER Paving & Curb.....	\$ 12.34	
Structures.....	\$ 12.23	
LABORER Asphalt Raker.....	\$ 12.36	
Flagger.....	\$ 10.33	
Laborer, Common.....	\$ 11.02	
Laborer, Utility.....	\$ 11.73	
Pipelayer.....	\$ 12.12	
Work Zone Barricade Servicer.....	\$ 11.67	
PAINTER (Structures).....	\$ 18.62	
POWER EQUIPMENT OPERATOR: Asphalt Distributor.....	\$ 14.06	
Asphalt Paving Machine.....	\$ 14.32	
Broom or Sweeper.....	\$ 12.68	
Concrete Pavement Finishing Machine.....	\$ 13.07	
Concrete Paving, Curing, Float, Texturing Machine....	\$ 11.71	
Concrete Saw.....	\$ 13.99	
Crane, Hydraulic 80 Tons or less.....	\$ 13.86	
Crane, Lattice boom 80 tons or less.....	\$ 14.97	
Crane, Lattice boom over 80 Tons.....	\$ 15.80	
Crawler Tractor.....	\$ 13.68	
Excavator, 50,000 pounds or less.....	\$ 12.71	
Excavator, Over 50,000 pounds.....	\$ 14.53	
Foundation Drill, Crawler Mounted.....	\$ 17.43	
Foundation Drill, Truck Mounted.....	\$ 15.89	
Front End Loader 3 CY or Less.....	\$ 13.32	
Front End Loader, Over 3 CY.	\$ 13.17	
Loader/Backhoe.....	\$ 14.29	
Mechanic.....	\$ 16.96	
Milling Machine.....	\$ 13.53	

Motor Grader, Fine Grade....\$ 15.69
 Motor Grader, Rough.....\$ 14.23
 Off Road Hauler.....\$ 14.60
 Pavement Marking Machine....\$ 11.18
 Piledriver.....\$ 14.95
 Roller, Asphalt.....\$ 11.95
 Roller, Other.....\$ 11.57
 Scraper.....\$ 13.47
 Spreader Box.....\$ 13.58

Servicer.....\$ 13.97

Steel Worker

Reinforcing Steel.....\$ 15.15
 Structural Steel Welder.....\$ 12.85
 Structural Steel.....\$ 14.39

TRUCK DRIVER

Low Boy Float.....\$ 16.03
 Single Axle.....\$ 11.46
 Single or Tandem Axle Dump..\$ 11.48
 Tandem Axle Tractor w/Semi
 Trailer.....\$ 12.27

 WELDERS - Receive rate prescribed for craft performing
 operation to which welding is incidental.

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 Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
 for Federal Contractors applies to all contracts subject to the
 Davis-Bacon Act for which the contract is awarded (and any
 solicitation was issued) on or after January 1, 2017. If this
 contract is covered by the EO, the contractor must provide
 employees with 1 hour of paid sick leave for every 30 hours
 they work, up to 56 hours of paid sick leave each year.
 Employees must be permitted to use paid sick leave for their
 own illness, injury or other health-related needs, including
 preventive care; to assist a family member (or person who is
 like family to the employee) who is ill, injured, or has other
 health-related needs, including preventive care; or for reasons
 resulting from, or to assist a family member (or person who is
 like family to the employee) who is a victim of, domestic
 violence, sexual assault, or stalking. Additional information
 on contractor requirements and worker protections under the EO
 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within
 the scope of the classifications listed may be added after
 award only as provided in the labor standards contract clauses
 (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator

U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION

"

**BID PROPOSAL
FRIENDSWOOD LAKES BLVD**

SITE PREPARATION AND EARTHWORK ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	100	Prepare Right-of-Way	STA	51	_____		
					DOLLARS AND _____ CENTS		
2	110	Roadway Excavation Including 3" Topsoil	CY.	13,305	_____		
					DOLLARS AND _____ CENTS		
3	110	Cut Mitigation for North and South Eagle Creek	CY.	1,016	_____		
					DOLLARS AND _____ CENTS		
4	132	Roadway Embankment	CY.	13,525	_____		
					DOLLARS AND _____ CENTS		
5	636	Project Identification Sign	EA	2	_____		
					DOLLARS AND _____ CENTS		
6	Plans	Remove / Relocate Existing Traffic Signs and/or Road Signs	LS	1	_____		
					DOLLARS AND _____ CENTS		
7	Plans	Small Roadside Signs w/ Post	LS	1	_____		
					DOLLARS AND _____ CENTS		

TOTAL SITE PREPARATION AND EARTHWORK ITEMS

PAVING ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	260	8" Lime Stabilized Subgrade	SY	31,383	_____		
					DOLLARS AND _____ CENTS		
2	260	Lime for Stabilization (48 lbs./SY)	TON	755	_____		
					DOLLARS AND _____ CENTS		
3	360	Reinforce Concrete Pavement (8")	SY	29,300	_____		
					DOLLARS AND _____ CENTS		
4	529	6" Concrete Curb	LF	18,563	_____		
					DOLLARS AND _____ CENTS		
5	531	4 Ft Concrete Sidewalk	SY	4,052	_____		
					DOLLARS AND _____ CENTS		
6	531	Curb Ramp Type 7	EA	14	_____		
					DOLLARS AND _____ CENTS		
7	536	Concrete Media Nose	SY	23	_____		
					DOLLARS AND _____ CENTS		

TOTAL PAVING ITEMS

STORM SEWER ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	402	Trench Excavation Protection	LF	6,679	_____		
					DOLLARS AND _____ CENTS		
2	432	Concrete Slope Paving (4-inch)	CY	55	_____		
					DOLLARS AND _____ CENTS		
3	462	5'X3' RCB (C76, Class III)	LF	950	_____		
					DOLLARS AND _____ CENTS		
4	462	5'X4'RCB (C76, Class III)	LF	20	_____		
					DOLLARS AND _____ CENTS		
5	462	7'x4' RCB (C76, Class III)	LF	1,211	_____		
					DOLLARS AND _____ CENTS		
6	462	12'x8' RCB (C76, Class III)	LF	25	_____		
					DOLLARS AND _____ CENTS		

7	464	18" RCP (C76, Class III)	LF	2,741	_____		
					DOLLARS AND _____ CENTS		
8	464	24" RCP (C76, Class III)	LF	1,435	_____		
					DOLLARS AND _____ CENTS		
9	464	36" RCP (C76, Class III)	LF	307	_____		
					DOLLARS AND _____ CENTS		
10	465	Type "H-2" Inlet	EA	24	_____		
					DOLLARS AND _____ CENTS		
11	465	Type "C" Manhole	EA	10	_____		
					DOLLARS AND _____ CENTS		
12	465	Type "E" Inlet	EA	5	_____		
					DOLLARS AND _____ CENTS		
13	465	Type "S" Inlet	EA	1	_____		
					DOLLARS AND _____ CENTS		
14	465	Junction Box (6'x4')	EA	1	_____		
					DOLLARS AND _____ CENTS		
15	465	Junction Box (6'x6')	EA	3	_____		
					DOLLARS AND _____ CENTS		
16	465	Junction Box (9'x4')	EA	2	_____		
					DOLLARS AND _____ CENTS		
17	465	Junction Box (9'x9')	EA	2	_____		
					DOLLARS AND _____ CENTS		
18	466	Conc Headwalls/wingswalls w/parallel wings for box culverts (PW-1) (12'X8' RCB) (Hw=11')	EA	1	_____		
					DOLLARS AND _____ CENTS		
19	466	Conc Headwalls/wingswalls w/parallel wings for box culverts (PW-1) (7'X4' RCB) (Hw=8')	EA	2	_____		
					DOLLARS AND _____ CENTS		

TOTAL STORM SEWER ITEMS

STORM WATER POLLUTION PREVENTION PLAN ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	506	RFF Fence	LF	15,000	_____		
					DOLLARS AND _____ CENTS		
2	506	Inlet Protection Barrier	EA	37	_____		
					DOLLARS AND _____ CENTS		
3	506	Stabilized Construction Exit	SY	400	_____		
					DOLLARS AND _____ CENTS		
4	506	Hydro-Mulch Seeding	AC	1	_____		
					DOLLARS AND _____ CENTS		

TOTAL STORM WATER POLLUTION PREVENTION PLAN ITEMS

TRAFFIC CONTROL PLAN ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	502	Traffic Control Including Signs and Barricades	MO	9	_____		
					DOLLARS AND _____ CENTS		
2	540	Guard Rail	LF	111	_____		
					DOLLARS AND _____ CENTS		

TOTAL TRAFFIC CONTROL PLAN ITEMS

WASTE WATER IMPROVEMENTS ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	7017	Sanitary Sewer (8-in)(PVC)(C-900) (By open cut)	LF	561	_____		
					DOLLARS AND _____ CENTS		
2	7017	Sanitary Sewer (10-in)(PVC)(C-900) (By open cut)	LF	799	_____		
					DOLLARS AND _____ CENTS		
3	7017	Manhole (San Sewer)	EA	8	_____		
					DOLLARS AND _____ CENTS		
4	7017	Casing Steel (14-in)	LF	12	_____		
					DOLLARS AND _____ CENTS		
5	7017	Sanitary Sewer (30-in)(PVC)(C-900) (w/36-in Casing Steel)(By open cut)	LF	40	_____		
					DOLLARS AND _____ CENTS		
6	7017	Trench Excavation Protection	LF	1,400	_____		
					DOLLARS AND _____ CENTS		
7	7017	Service Connection (Sanitary Sewer)	EA	2	_____		
					DOLLARS AND _____ CENTS		

TOTAL WASTEWATER IMPROVEMENTS ITEMS

WATER IMPROVEMENTS ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	7049	WTR PIPE (PVC C900DR14)(8") (By open cut)	LF	4,621	_____		
					DOLLARS AND _____ CENTS		
2	7049	WTR PIPE (PVC C900DR18)((8") W/ 14" Casing Steel (Auger)	LF	220	_____		
					DOLLARS AND _____ CENTS		
3	7049	TS&V (8"x8")	EA	1	_____		
					DOLLARS AND _____ CENTS		
4	7049	TS&V (12"x8")	EA	2	_____		
					DOLLARS AND _____ CENTS		
5	7049	Trench Excavation Protection	LF	4,401	_____		
					DOLLARS AND _____ CENTS		
6	7049	Fire Hydrant Assembly	EA	8	_____		
					DOLLARS AND _____ CENTS		
7	7049	Casing Steel (14 IN)	LF	103	_____		
					DOLLARS AND _____ CENTS		
8	7049	8" Water Wet Connection	EA	1	_____		
					DOLLARS AND _____ CENTS		
9	7049	8 " Gate Valve & Box	EA	10	_____		
					DOLLARS AND _____ CENTS		
10	7049	TEE (8" x 8")	EA	4	_____		
					DOLLARS AND _____ CENTS		
11	7049	8" Temporary Plug and Clamp	EA	5	_____		
					DOLLARS AND _____ CENTS		

TOTAL WATER IMPROVEMENTS ITEMS

SIGNING AND PAVEMENT MARKINGS ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	666	Aluminum Signs (Ground Mounted)-Furnish & Install	EA.	6.00	_____ DOLLARS AND _____ CENTS		
2	666	Reflectorized Pavement Markings Type I (Thermoplastic) 4" White/Dashed - Furnish & Applied	LF	3,870	_____ DOLLARS AND _____ CENTS		
3	666	Reflectorized Pavement Markings Type I (Thermoplastic) 8" White/Solid - Furnish & Applied	LF	480	_____ DOLLARS AND _____ CENTS		
4	666	Reflectorized Pavement Markings Type I (Thermoplastic) 12" White/Solid - Furnish & Applied	LF	83	_____ DOLLARS AND _____ CENTS		
5	666	Reflectorized Pavement Markings Type I (Thermoplastic) 24" White/Solid - Furnish & Applied	LF	16	_____ DOLLARS AND _____ CENTS		
6	666	Reflectorized Pavement Markings Type I (Thermoplastic) Single Arrow - Furnish & Applied	EA.	5	_____ DOLLARS AND _____ CENTS		
7	666	Reflectorized Pavement Markings Type I (Thermoplastic) Word "ONLY" - Furnish & Applied	EA.	5	_____ DOLLARS AND _____ CENTS		
8	666	Reflectorized Yellow Paint for Esplanade (ER-ER)	LF	1,713	_____ DOLLARS AND _____ CENTS		
9	666	Reflectorized Pavement Markers Type I-C-R - Furnish & Install	EA.	180	_____ DOLLARS AND _____ CENTS		
10	666	Reflectorized Pavement Markers Type II-C-R - Furnish & Install	EA.	260	_____ DOLLARS AND _____ CENTS		
11	666	Nose Surface Colored Black	SY	23	_____ DOLLARS AND _____ CENTS		

TOTAL SIGNING AND PAVEMENT MARKINGS ITEMS
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BASE BID SUMMARY

TOTAL SITE PREPARATION AND EARTHWORK ITEMS	_____
TOTAL PAVING ITEMS	_____
TOTAL STORM SEWER ITEMS	_____
TOTAL STR WTR POLLUTION PREVENTION PLAN ITEMS	_____
TOTAL TRAFFIC CONTROL PLAN ITEMS	_____
TOTAL WASTEWATER IMPROVEMENTS ITEMS	_____
TOTAL WATER IMPROVEMENTS ITEMS	_____
TOTAL SIGNING AND PAVEMENT MARKINGS ITEMS	_____
TOTAL ITEMS BID PRICE :	_____

For a bid to be considered responsive all sections must be completed.

**BID PROPOSAL
ALTERNATE NO. 1
FRIENDSWOOD LAKES BLVD**

SITE PREPARATION AND EARTHWORK ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	100	Prepare Right-of-Way	STA	5	_____ DOLLARS AND _____ CENTS		
2	110	Roadway Excavation Including 3" Topsoil	CY.	803	_____ DOLLARS AND _____ CENTS		
3	132	Roadway Embankment	CY.	66	_____ DOLLARS AND _____ CENTS		
4	636	Project Identification Sign	EA	1	_____ DOLLARS AND _____ CENTS		
5	Plans	Remove / Relocate Existing Traffic Signs and/or Road Signs	LS	1	_____ DOLLARS AND _____ CENTS		
6	Plans	Small Roadside Signs w/ Post	LS	1	_____ DOLLARS AND _____ CENTS		
TOTAL SITE PREPARATION AND EARTHWORK ITEMS							

PAVING ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	260	8" Lime Stabilized Subgrade	SY	1,990	_____ DOLLARS AND _____ CENTS		
2	260	Lime for Stabilization (48 lbs./SY)	TON	48	_____ DOLLARS AND _____ CENTS		
3	360	Reinforce Concrete Pavement (8")	SY	1,872	_____ DOLLARS AND _____ CENTS		
4	529	6" Concrete Curb	LF	953	_____ DOLLARS AND _____ CENTS		
5	531	4 Ft Concrete Sidewalk	SY	177	_____ DOLLARS AND _____ CENTS		
6	531	Curb Ramp Type 7	EA	4	_____ DOLLARS AND _____ CENTS		
7	536	Concrete Media Nose	SY	10	_____ DOLLARS AND _____ CENTS		
TOTAL PAVING ITEMS							

STORM SEWER ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	402	Trench Excavation Protection	LF	644	_____ DOLLARS AND _____ CENTS		
2	432	Concrete Riprap (6-inch)	CY	2	_____ DOLLARS AND _____ CENTS		
3	462	3'X3' RCB (C76, Class III)	LF	40	_____ DOLLARS AND _____ CENTS		
4	464	18" RCP (C76, Class III)	LF	52	_____ DOLLARS AND _____ CENTS		
5	464	30" RCP (C76, Class III)	LF	51	_____ DOLLARS AND _____ CENTS		
6	464	36" RCP (C76, Class III)	LF	279	_____ DOLLARS AND _____ CENTS		

7	464	48" RCP (C76, Class III)	LF	222	_____		
					DOLLARS AND _____ CENTS		
8	465	Type "H-2" Inlet	EA	2	_____		
					DOLLARS AND _____ CENTS		
9	465	Type "C" Manhole	EA	1	_____		
					DOLLARS AND _____ CENTS		
10	465	Type "E" Inlet	EA	4	_____		
					DOLLARS AND _____ CENTS		

TOTAL STORM SEWER ITEMS

STORM WATER POLLUTION PREVENTION PLAN ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	506	RFF Fence	LF	500	_____		
					DOLLARS AND _____ CENTS		
2	506	Inlet Protection Barrier	EA	5	_____		
					DOLLARS AND _____ CENTS		
3	506	Stabilized Construction Exit	SY	78	_____		
					DOLLARS AND _____ CENTS		
4	506	Hydro-Mulch Seeding	AC	0.2	_____		
					DOLLARS AND _____ CENTS		

TOTAL STORM WATER POLLUTION PREVENTION PLAN ITEMS

TRAFFIC CONTROL PLAN ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	502	Traffic Control Including Signs and Barricades	MO	4	_____		
					DOLLARS AND _____ CENTS		

TOTAL TRAFFIC CONTROL PLAN ITEMS

WATER IMPROVEMENTS ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	7049	WTR PIPE (PVC C900DR14)(8") (By open cut)	LF	352	_____		
					DOLLARS AND _____ CENTS		
2	7049	Trench Excavation Protection	LF	352	_____		
					DOLLARS AND _____ CENTS		
3	7049	Casing Steel (14 IN)	LF	14	_____		
					DOLLARS AND _____ CENTS		
4	7049	8" Water Wet Connection	EA	1	_____		
					DOLLARS AND _____ CENTS		
5	7049	8 " Gate Valve & Box	EA	2	_____		
					DOLLARS AND _____ CENTS		
6	7049	TEE (8" x 8")	EA	1	_____		
					DOLLARS AND _____ CENTS		
7	7049	8" Temporary Plug and Clamp	EA	1	_____		
					DOLLARS AND _____ CENTS		

TOTAL WATER IMPROVEMENTS ITEMS

SIGNING AND PAVEMENT MARKINGS ITEMS

ITEM NO.	SPEC. NO.	DESCRIPTION	UNIT	QUAN.	UNIT PRICE IN WORDS	UNIT PRICE	TOTAL PRICE
1	666	Reflectorized Pavement Markings Type I (Thermoplastic) 4" White/Dashed - Furnish & Applied	LF	200	_____ DOLLARS AND _____ CENTS		
2	666	Reflectorized Yellow Paint for Esplanade (ER-ER)	LF	200	_____ DOLLARS AND _____ CENTS		
3	666	Reflectorized Pavement Markers Type II-C-R - Furnish & Install	EA.	20	_____ DOLLARS AND _____ CENTS		
4	666	Nose Surface Colored Black	SY	10	_____ DOLLARS AND _____ CENTS		

TOTAL SIGNING AND PAVEMENT MARKINGS ITEMS

ALTERNATE NO. 1 BID SUMMARY

TOTAL SITE PREPARATION AND EARTHWORK ITEMS	_____
TOTAL PAVING ITEMS	_____
TOTAL STORM SEWER ITEMS	_____
TOTAL STR WTR POLLUTION PREVENTION PLAN ITEMS	_____
TOTAL TRAFFIC CONTROL PLAN ITEMS	_____
TOTAL WATER IMPROVEMENTS ITEMS	_____
TOTAL SIGNING AND PAVEMENT MARKINGS ITEMS	_____
<hr/>	
TOTAL ITEMS ALTERNATE NO. 1 BID PRICE :	_____

TOTAL BID SUMMARY

TOTAL BASE BID	_____
TOTAL ALTERNATE NO. 1 BID	_____
TOTAL BASE BID + TOTAL ALTERNATE NO. 1 BID	_____

For a bid to be considered responsive all sections must be completed.

Contract Award (continued)

Invitation to Bid, General Provisions, Special Provisions, Bid Forms, Non-Collusion Affidavit, Vendor Qualification Packet, Debarment Form, Special Provisions for Construction, Bid Proposal, Affidavit and Surety Forms, Wage Rates, Specifications and Plans and any Addenda attached to this Contract Award are all made a part of this Contract and collectively evidence and constitute the entire contract. Contractor shall furnish all materials, perform all of the work required to be done and do everything else required by these documents.

Time of Completion: The Contractor shall complete the work within 270 Calendar Days of the issuance of the notice to proceed. The time set forth for completion of the work is an essential element of the Contract.

The Contract Sum: The County shall pay the Contractor for performance of the Contract, the sum of _____

_____ Dollars and ___/100 (\$ _____), payments to be made as described herein.

Performance Bond required: (x) yes () no
Payment Bond required: (x) yes () no

This Contract is issued pursuant to award made by Commissioners' Court on _____, 20__.

EXECUTED this ____ day of _____, 20__.

COUNTY OF GALVESTON, TEXAS

BY: _____
MARK HENRY, County Judge

ATTEST:

DWIGHT SULLIVAN, County Clerk

CONTRACTOR

BY: _____
Signature - Title

Printed Name

CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIEN

TO (Owner): COUNTY OF GALVESTON, TEXAS

PROJECT NO: 20-1109

PROJECT: Friendswood Lakes Blvd.

CONTRACT FOR:

CONTRACT DATE:

State of:

County of:

The undersigned, hereby certifies that, to the best of his knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS: (If none, write "None". If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception.)

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Sub-contractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR:

Address:

BY:

Subscribed and sworn to before me this

day of _____ 20

Notary Public:

My Commission Expires:

CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS

TO (Owner): COUNTY OF GALVESTON, TEXAS

PROJECT NO: 20-1109

PROJECT: Friendswood lakes Blvd.

CONTRACT FOR:

CONTRACT DATE:

State of:

County of:

The undersigned, hereby certifies that, except as listed below, he has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or his property might in any way be held responsible.

EXCEPTIONS: (If none, write "None". If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception.)

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment.
Whenever Surety is involved, consent of Surety is required. CONSENT OF SURETY, may be used for this purpose.
Indicate attachment: yes_____ no_____

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Sub-contractors and material and equipment suppliers to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens.

CONTRACTOR:

Address:

BY:

Subscribed and sworn to before me this

day of _____ 20

Notary Public:

My Commission Expires:

CONSENT OF SURETY TO REDUCTION IN OR PARTIAL RELEASE OF RETAINAGE

TO (Owner): COUNTY OF GALVESTON, TEXAS

PROJECT NO: 20-1109

CONTRACT FOR:

PROJECT: Friendswood Lakes Blvd.

CONTRACT DATE:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(here insert name and address of Surety as it appears in the bond).

, SURETY,

on bond of (here insert name and address of Contractor as it appears in the bond)

, CONTRACTOR,

hereby approves the reduction in or partial release of retainage to the contractor as follows:

The Surety agrees that such reduction in or partial release of retainage to the Contractor shall not relieve the Surety of
any of its obligations to (here insert name and address of Owner)

, OWNER,

as set forth in the said Surety's bond.

IN WITNESS WHEREOF,
the Surety has hereunto set its had this

day of

20 .

Surety

Signature of Authorized Representative

Title

ATTEST:
(Seal):

CONSENT OF SURETY COMPANY TO FINAL PAYMENT

TO (Owner): COUNTY OF GALVESTON, TEXAS

PROJECT NO: 20-1109

CONTRACT FOR:

PROJECT: Friendswood Lakes Blvd.

CONTRACTOR DATE:

CONTRACTOR:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(here insert name and address of Surety as it appears in the bond).

, SURETY COMPANY,

on bond of (here insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety
Company of any of its obligations to (here insert name and address of Owner)

, OWNER,

as set forth in the said Surety Company's bond.

IN WITNESS WHEREOF,

the Surety Company has hereunto set its had this

day of

2020

Surety Company

Signature of Authorized
Representative

Title

ATTEST:

(Seal):

NOTE: This form is to be use as a companion document to Contractor's Affidavit of Payment of Debts and Claims.

SPECIAL PROVISION TO ITEM 1

"DEFINITION OF TERMS"

For this project, Item 1 of the Texas Standard Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this Item are waived or changed hereby:

THE TERM "DEPARTMENT," "STATE," "STATE HIGHWAY DEPARTMENT OF TEXAS", "TxDOT", "TEXAS DEPARTMENT OF TRANSPORTATION", "STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION," "STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION COMMISSION," "COMMISSION," AND "STATE HIGHWAY COMMISSION," SHALL, IN THE USE OF THE STANDARD SPECIFICATIONS FOR ALL WORK IN CONNECTION WITH THIS PROJECT, BE DEEMED TO MEAN GALVESTON COUNTY, PARTY OF THE FIRST PART IN ACCOMPANYING CONTRACT OR CONTRACTS. ANY REFERENCE IN THE TEXAS STANDARD SPECIFICATIONS TO THE STATE OF TEXAS, ITS OFFICIALS, EMPLOYEES, OR AGENTS SHALL BE DEEMED TO MEAN GALVESTON COUNTY, ITS OFFICIALS, EMPLOYEES, OR AGENTS.

Articles 1.26, "Certificate of Insurance" ; 1.28, "Commission", 1.47, "Department", 1.70 "Letting Official " and 1.124 "State" are deleted.

Article 1.53, "ENGINEER", is revised to read in its entirety as follows:

1.53 ENGINEER. Galveston County Engineer or his authorized representatives. If a representative is authorized to function as the ENGINEER'S representative with respect to certain ENGINEER'S activities that representative's responsibilities and obligations shall be limited as provided in Article 1.148.

Article 1.64, "INSPECTOR," is revised to read in its entirety as follows:

1.64 INSPECTOR. The representative of the ENGINEER assigned and authorized to observe or inspect any or all parts of the work and the material to be used therein. A representative is authorized to function as the ENGINEER'S representative with respect to certain activities, and that representative's responsibilities and obligations shall be limited as provided in Article 1.148.

Special Provisions to Item 1

"DEFINITION OF TERMS"

ADDITIONAL ARTICLES ARE ADDED AS FOLLOWS:

1.148 CONSULTING ENGINEER. Independent engineering firms contracting with Galveston County for the providing of professional engineering services. The engineering firms are the representatives of Galveston County only to the extent provided in the Contract documents and in such special instances where they are specifically authorized by Galveston County so to act. All powers and rights assigned by Galveston County to the engineering firms with respect to the work are solely and exclusively for the benefit of Galveston County and not for the CONTRACTOR. In carrying out of its powers and rights assigned by Galveston County the engineering firms shall function as a representative of Galveston County and shall act by and for Galveston County. Irrespective of what authority may be assigned by Galveston County to the engineering firms, CONTRACTOR remains fully and solely responsible and liable for its obligations to perform the work in accordance with the requirements of the plans and specifications; to insure against failures in safety precautions; to carry out his work pursuant to safe methods of construction; to select and fulfill the proper manner, means, and methods in performing the work in order to meet the plans and specifications; and to complete the work in accordance with the contract documents.

SPECIAL PROVISION TO ITEM 2
INSTRUCTIONS TO BIDDERS

For this project, Item 2 of the Texas Standard Specifications is hereby deleted in its entirety.
The Instructions to Bidders is included elsewhere in the Contract Documents.

SPECIAL PROVISION TO ITEM 3

AWARD AND EXECUTION OF CONTRACT

For this project, Item 3 of the Texas Standard Specifications is hereby deleted in its entirety.

The Award and Execution of Contract is included elsewhere in the Contract Documents.

SPECIAL PROVISION TO ITEM 4

SCOPE OF WORK

For this project, Item 4 of the Texas Standard Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this Item are waived or changed hereby.

ARTICLE 4.2 "CHANGES IN WORK;" ARTICLE 4.3 "DIFFERING SITE CONDITIONS" and ARTICLE 4.4 "REQUESTS AND CLAIMS FOR ADDITIONAL COMPENSATION" are deleted in their entirety and replaced by Article 41 "CHANGES and ALTERATIONS" and ARTICLE 42 "EXTRA WORK" of "Special Provisions for Construction".

SPECIAL PROVISION TO ITEM 5

CONTROL OF THE WORK

For this project, Item 5 of the Texas Standard Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this Item are waived or changed hereby.

ARTICLE 5.2 "PLANS AND WORKING DRAWINGS." The first sentence of the first paragraph is hereby revised to read as follows:

When required, the Contractor shall provide working drawings to supplement the plans with all necessary details not included on the Contract plans.

ARTICLE 5.5 "COOPERATION OF CONTRACTOR." The last sentence of the first paragraph is hereby revised to read as follows:

The Contractor will be supplied with three (3) copies of the plans, specifications and special provisions and he shall have one (1) copy of each available on the project at all times.

ARTICLE 5.6 "CONSTRUCTION SURVEYING," is hereby deleted in its entirety.

ARTICLE 5.7 "INSPECTION." The sixth sentence of the second paragraph is hereby revised to read as follows:

If the uncovered work is acceptable, the costs to uncover, remove and replace or make good the parts removed will be paid for in accordance with Article 41. "Changes and Alterations" of "Special Provisions for Construction".

ARTICLE 5.8 "FINAL ACCEPTANCE," is hereby deleted in its entirety. It is replaced by Article 6(b). "PAYMENTS TO CONTRACTOR, FINAL PAYMENT" of "Special Provisions for Construction".

SPECIAL PROVISION TO ITEM 6

CONTROL OF MATERIALS

For this project, Item 6 of the Texas Standard Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this Item are waived or changed hereby.

ARTICLE 6.1 "SOURCE CONTROL." Paragraph A. "Buy America" and B. "Buy Texas" are hereby deleted in their entirety.

ARTICLE 6.7 "Department-furnished Material" is hereby deleted in its entirety.

SPECIAL PROVISION TO ITEM 7

LEGAL RELATIONS AND RESPONSIBILITIES

For this project, Item 7 of the Texas Standard Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this Item are waived or changed hereby.

ARTICLE 7.4 "INSURANCE AND BONDS" is hereby deleted in its entirety.

ARTICLE 7.5 "RESTORING SURFACES OPENED BY PERMISSION." The third sentence of the first paragraph is hereby revised to read as follows:

Payment for repair of surfaces opened by permission will be made in accordance with Article 41. "Changes and Alterations" of "Special Provisions for Construction".

SPECIAL PROVISION TO ITEM 8

PROSECUTION AND PROGRESS

For this project, Item 8 of the Texas Standard Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this Item are waived or changed hereby.

ARTICLE 8.1 "PROSECUTION OF WORK" The third sentence in the first paragraph is hereby revised to read as follows:

"The Contractor shall begin the work to be performed under the contract within ten (10) days after the date of the authorization to begin work as shown on the work order.

ARTICLE 8.2 "PROGRESS SCHEDULES", B. "CONSTRUCTION CONTRACTS" The first sentence in the first paragraph is hereby revised to read as follows:

If required by the Engineer, before starting work on a construction Contract, prepare and submit a progress schedule based on the sequence of work and traffic control plan shown in the Contract.

SPECIAL PROVISION TO ITEM 9

MEASUREMENT AND PAYMENT

For this project, Item 9 of the Texas Standard Specifications is hereby amended with respect to the clauses cited below and no other clauses or requirements of this Item are waived or changed hereby.

ARTICLE 9.2 "PLANS QUANTITY MEASUREMENT" is hereby revised to read as follows: Plans quantities may not represent the exact quantity of work performed or material moved, handled, or placed during the execution of the Contract. The estimated bid quantities are designated as final payment quantities.

ARTICLE 9.4 "PAYMENT FOR EXTRA WORK" is hereby revised to read as follows:

Extra work ordered, performed and accepted will be paid for in accordance with ARTICLE 42, "EXTRA WORK" of "Special Provisions for Construction".

ARTICLE 9.5 "FORCE ACCOUNT" is hereby deleted in its entirety.

ARTICLE 9.6 "PROGRESS PAYMENTS" is hereby deleted in its entirety and replaced by ARTICLE 36, "PROGRESS PAYMENTS AND RETAINAGE" of Section IV, "General Terms and Conditions".

ARTICLE 9.8 "FINAL PAYMENT" and ARTICLE 40, "FINAL PAYMENT" are hereby deleted in their entirety and replaced by ARTICLE 6(b), "PAYMENTS TO CONTACTOR, FINAL PAYMENT" of "Special Provisions for Construction".

Item 100

Preparing Right of Way

1. DESCRIPTION

Prepare the right of way and designated easements for construction operations by removing and disposing of all obstructions when removal of such obstructions is not specifically shown on the plans to be paid by other Items.

2. CONSTRUCTION

Protect designated features on the right of way and prune trees and shrubs as directed. Do not park equipment, service equipment, store materials, or disturb the root area under the branches of trees designated for preservation. Treat cuts on trees with an approved tree wound dressing within 20 min. of making a pruning cut or otherwise causing damage to the tree when shown on the plans. Follow all local and state regulations when burning. Pile and burn brush at approved locations as directed. Coordinate work with state and federal authorities when working in state or national forests or parks. Test, remove, and dispose of hazardous materials in accordance with Article 6.10., "Hazardous Materials."

Clear areas shown on the plans of all obstructions, except those landscape features that are to be preserved. Such obstructions include remains of houses and other structures, foundations, floor slabs, concrete, brick, lumber, plaster, septic tank drain fields, basements, abandoned utility pipes or conduits, equipment, fences, retaining walls, and other items as specified on the plans. Remove vegetation and other landscape features not designated for preservation, curb and gutter, driveways, paved parking areas, miscellaneous stone, sidewalks, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron, and debris, whether above or below ground. Removal of live utility facilities is not included in this Item. Remove culverts, storm sewers, manholes, and inlets in proper sequence to maintain traffic and drainage.

Notify the Engineer in writing when items not shown on the plans and not reasonably detectable (buried with no obvious indication of presence) are encountered and required to be removed. These items will be handled in accordance with Article 4.5., "Differing Site Conditions."

Remove obstructions not designated for preservation to 2 ft. below natural ground in areas receiving embankment. Remove obstructions to 2 ft. below the excavation level in areas to be excavated. Remove obstructions to 1 ft. below natural ground in all other areas. Cut trees and stumps off to ground level when allowed by the plans or directed. Plug the remaining ends of abandoned underground structures over 3 in. in diameter with concrete to form a tight closure. Backfill, compact, and restore areas where obstructions have been removed unless otherwise directed. Use approved material for backfilling. Dispose of wells in accordance with Item 103, "Disposal of Wells."

Accept ownership, unless otherwise directed, and dispose of removed materials and debris at locations off the right of way in accordance with local, state, and federal requirements.

3. MEASUREMENT

This Item will be measured by the acre; by the 100-ft. station, regardless of the width of the right of way; or by each tree removed.

4.**PAYMENT**

For “acre” and “station” measurement, the work performed in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Preparing Right of Way.” For “each” measurement, the work performed in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Preparing Right of Way (Tree)” of the diameter specified. This price is full compensation for pruning of designated trees and shrubs; removal and disposal of structures and obstructions; backfilling of holes; furnishing and placing concrete for plugs; and equipment, labor, tools, and incidentals.

Total payment of this Item will not exceed 10% of the original contract amount until final acceptance. The remainder will be paid on the estimate after the final acceptance under Article 5.12., “Final Acceptance

Item 110

Excavation

1. DESCRIPTION

Excavate areas as shown on the plans or as directed. Remove materials encountered to the lines, grades, and typical sections shown on the plans and cross-sections.

2. CONSTRUCTION

Accept ownership of unsuitable or excess material and dispose of material in accordance with local, state, and federal regulations at locations outside the right of way.

Maintain drainage in the excavated area to avoid damage to the roadway section. Correct any damage to the subgrade caused by weather at no additional cost to the Department.

Shape slopes to avoid loosening material below or outside the proposed grades. Remove and dispose of slides as directed.

2.1 **Rock Cuts.** Excavate to finish subgrade. Manipulate and compact subgrade in accordance with Section 132.3.4., "Compaction Methods," unless excavation is to clean homogenous rock at finish subgrade elevation. Use approved embankment material compacted in accordance with Section 132.3.4., "Compaction Methods," to replace undercut material at no additional cost if excavation extends below finish subgrade.

2.2 **Earth Cuts.** Excavate to finish subgrade. Scarify subgrade to a uniform depth at least 6 in. below finish subgrade elevation in areas where base or pavement structure will be placed on subgrade. Manipulate and compact subgrade in accordance with Section 132.3.4., "Compaction Methods."

Take corrective measures as directed if unsuitable material is encountered below subgrade elevations.

2.3 **Subgrade Tolerances.** Excavate to within 1/2 in. in cross-section and 1/2 in. in 16 ft. measured longitudinally for turnkey construction. Excavate to within 0.1 ft. in cross-section and 0.1 ft. in 16 ft. measured longitudinally for staged construction.

3. MEASUREMENT

This Item will be measured by the cubic yard in its original position as computed by the method of average end areas.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

Limits of measurement for excavation in retaining wall areas will be as shown on the plans.

Shrinkage or swelling factors will not be considered in determining the calculated quantities.

4.**PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Excavation (Roadway)," "Excavation (Channel)," "Excavation (Special)," or "Excavation (Roadway and Channel)." This price is full compensation for authorized excavation; drying; undercutting subgrade and reworking or replacing the undercut material in rock cuts; hauling; disposal of material not used elsewhere on the project; scarification and compaction; and equipment, labor, materials, tools, and incidentals.

Drying required deeper than 6 in. below subgrade elevation will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method." Excavation and replacement of unsuitable material below subgrade elevations will be performed and paid for in accordance with the applicable bid items. However, if Item 132, "Embankment," is not included in the Contract, payment for replacement of unsuitable material will be paid for in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

When a slide not due to the Contractor's negligence or operation occurs, payments for removal and disposal of the slide material will be in accordance with Article 9.7., "Payment for Extra Work and Force Account Method." Excavation in backfill areas of retaining walls will not be measured or paid for directly but will be subsidiary to pertinent Items.

Item 132

Embankment

1. DESCRIPTION

Furnish, place, and compact materials for construction of roadways, embankments, levees, dikes, or any designated section of the roadway where additional material is required.

2. MATERIALS

Furnish approved material capable of forming a stable embankment from required excavation in the areas shown on the plans or from sources outside the right of way. Provide one or more of the following types as shown on the plans:

- **Type A.** Granular material that is free from vegetation or other objectionable material and meets the requirements of Table 1.

Table 1
Testing Requirements

Property	Test Method	Specification Limit
Liquid limit	Tex-104-E	≤ 45
Plasticity index (PI)	Tex-106-E	≤ 15
Bar linear shrinkage	Tex-107-E	≥ 2

Perform the Linear Shrinkage test only as indicated in [Tex-104-E](#).

- **Type B.** Materials such as rock, loam, clay, or other approved materials.
- **Type C.** Material meeting the specification requirements shown on the plans. Type C may be further designated as Type C1, C2, etc.
- **Type D.** Material from required excavation areas shown on the plans.

Meet the requirements of the pertinent retaining wall Items for retaining wall backfill material.

3. CONSTRUCTION

Meet the requirements of Item 7, "Legal Relations and Responsibilities," when off right of way sources are used. Notify the Engineer before opening a material source to allow for required testing. Complete preparation of the right of way in accordance with Item 100, "Preparing Right of Way," for areas to receive embankment.

Backfill tree-stump holes or other minor excavations with approved material and tamp. Restore the ground surface, including any material disked loose or washed out, to its original slope. Compact the ground surface by sprinkling in accordance with Item 204, "Sprinkling," and by rolling using equipment complying with Item 210, "Rolling," when directed.

Scarify and loosen the unpaved surface areas, except rock, to a depth of at least 6 in. unless otherwise shown on the plans. Bench slopes before placing material. Begin placement of material at the toe of slopes. Do not place trees, stumps, roots, vegetation, or other objectionable material in the embankment. Simultaneously recompact scarified material with the placed embankment material. Do not exceed the layer depth specified in Section 132.3.4., "Compaction Methods."

Construct embankments to the grade and sections shown on the plans. Construct the embankment in layers approximately parallel to the finished grade for the full width of the individual roadway cross-sections unless otherwise shown on the plans. Ensure that each section of the embankment conforms to the detailed sections or slopes. Maintain the finished section, density, and grade until the project is accepted.

- 3.1. **Earth Embankments.** Earth embankment is mainly composed of material other than rock. Construct embankments in successive layers, evenly distributing materials in lengths suited for sprinkling and rolling.
- Treat material in accordance with Item 260, "Lime Treatment (Road-Mixed)" or Item 275, "Cement Treatment (Road-Mixed)" when required. Obtain approval to incorporate rock and broken concrete produced by the construction project in the lower layers of the embankment. Place the rock and concrete outside the limits of the completed roadbed when the size of approved rock or broken concrete exceeds the layer thickness requirements in Section 132.3.4., "Compaction Methods." Cut and remove all exposed reinforcing steel from the broken concrete.
- Move the material dumped in piles or windrows by blading or by similar methods and incorporate it into uniform layers. Featheredge or mix abutting layers of dissimilar material for at least 100 ft. to ensure there are no abrupt changes in the material. Break down clods or lumps of material and mix embankment until a uniform material is attained.
- Apply water free of industrial wastes and other objectionable matter to achieve the uniform moisture content specified for compaction.
- Roll and sprinkle each embankment layer in accordance with Section 132.3.4.1., "Ordinary Compaction," when ordinary compaction is specified. Compact the layer to the required density in accordance with Section 132.3.4.2., "Density Control," when density control is specified.
- 3.2. **Rock Embankments.** Rock embankment is mainly composed of rock. Construct rock embankments in successive layers for the full width of the roadway cross-section with a depth of 18 in. or less. Increase the layer depth for large rock sizes as approved. Do not exceed a depth of 2-1/2 ft. in any case. Fill voids created by the large stone matrix with smaller stones during the placement and filling operations.
- Ensure the depth of the embankment layer is greater than the maximum dimension of any rock. Do not place rock greater than 2 ft. in its maximum dimension, unless otherwise approved. Construct the final layer with graded material so that the density and uniformity is in accordance with Section 132.3.4., "Compaction Methods." Break up exposed oversized material as approved.
- Roll and sprinkle each embankment layer in accordance with Section 132.3.4.1., "Ordinary Compaction," when ordinary compaction is specified. Compact each layer to the required density in accordance with Section 132.3.4.2., "Density Control," when density control is specified. Proof-roll each rock layer as directed, where density testing is not possible, in accordance with Item 216, "Proof Rolling," to ensure proper compaction.
- 3.3. **Embankments Adjacent to Culverts and Bridges.** Compact embankments adjacent to culverts and bridges in accordance with Item 400, "Excavation and Backfill for Structures."
- 3.4. **Compaction Methods.** Begin rolling longitudinally at the sides and proceed toward the center, overlapping on successive trips by at least 1/2 the width of the roller. Begin rolling at the lower side and progress toward the high side on super elevated curves. Alternate roller trips to attain slightly different lengths. Compact embankments in accordance with Section 132.4.1., "Ordinary Compaction," or Section 132.3.4.2., "Density Control," as shown on the plans.
- 3.4.1. **Ordinary Compaction.** Use approved rolling equipment complying with Item 210, "Rolling," to compact each layer. Use specific equipment when required by the plans or the Engineer. Do not allow the loose depth of any layer to exceed 8 in., unless otherwise approved. Bring each layer to the moisture content directed before and during rolling operations. Compact each layer until there is no evidence of further consolidation. Maintain a level layer to ensure uniform compaction. Recompact and refinish the subgrade at no additional expense to the Department if the required stability or finish is lost for any reason.
- 3.4.2. **Density Control.** Compact each layer to the required density using equipment complying with Item 210, "Rolling." Determine the maximum lift thickness based on the ability of the compacting operation and

equipment to meet the required density. Do not exceed layer thickness of 16 in. loose or 12 in. compacted material unless otherwise approved. Maintain a level layer to ensure uniform compaction.

The Engineer will use [Tex-114-E](#) to determine the maximum dry density (D_a) and optimum moisture content (W_{opt}). Meet the requirements for field density and moisture content in Table 2 unless otherwise shown on the plans.

Table 2
Field Density Control Requirements

Description	Density	Moisture Content
	Tex-115-E	
PI ≤ 15	≥ 98% D_a	
15 < PI ≤ 35	≥ 98% D_a and ≤ 102% D_a	≥ W_{opt} .
PI > 35	≥ 95% D_a and ≤ 100% D_a	≥ W_{opt} .

Each layer is subject to testing by the Engineer for density and moisture content. During compaction, the moisture content of the soil should not exceed the value shown on the moisture-density curve, above optimum, required to achieve:

- 98% dry density for soils with a PI greater than 15 but less than or equal to 35 or
- 95% dry density for soils with PI greater than 35.

Remove small areas of the layer to allow for density tests as required. Replace the removed material and recompact at no additional expense to the Department. Proof-roll in accordance with Item 216, "Proof Rolling," when shown on the plans or as directed. Correct soft spots as directed.

- 3.5. **Maintenance of Moisture and Reworking.** Maintain the density and moisture content once all requirements in Table 2 are met. Maintain the moisture content no lower than 4% below optimum for soils with a PI greater than 15. Rework the material to obtain the specified compaction when the material loses the required stability, density, moisture, or finish. Alter the compaction methods and procedures on subsequent work to obtain specified density as directed.
- 3.6. **Acceptance Criteria.**
- 3.6.1. **Grade Tolerances.**
- 3.6.1.1. **Staged Construction.** Grade to within 0.1 ft. in the cross-section and 0.1 ft. in 16 ft. measured longitudinally.
- 3.6.1.2. **Turnkey Construction.** Grade to within 1/2 in. in the cross-section and 1/2 in. in 16 ft. measured longitudinally.
- 3.6.2. **Gradation Tolerances.** Ensure no more than 1 of the 5 most recent gradation tests is outside the specified limits on any individual sieve by more than 5% when gradation requirements are shown on the plans.
- 3.6.3. **Density Tolerances.** Ensure no more than 1 of the 5 most recent density tests for compaction work is outside the specified density limits, and no test is outside the limits by more than 3 pcf.
- 3.6.4. **Plasticity Tolerances.** Ensure no more than 1 of the 5 most recent PI tests for material is outside the specified limit by more than 2 points.

4. MEASUREMENT

Embankment will be measured by the cubic yard. Measurement will be further defined for payment as follows:

- 4.1. **Final.** The cubic yard will be measured in its final position using the average end area method. The volume is computed between the original ground surface or the surface upon which the embankment is to be constructed and the lines, grades, and slopes of the embankment. In areas of salvaged topsoil, payment for embankment will be made in accordance with Item 160, "Topsoil." Shrinkage or swell factors will not be considered in determining the calculated quantities.
- 4.2. **Original.** The cubic yard will be measured in its original and natural position using the average end area method.
- 4.3. **Vehicle.** The cubic yard will be measured in vehicles at the point of delivery.

When measured by the cubic yard in its final position, this is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

Shrinkage or swell factors are the Contractor's responsibility. When shown on the plans, factors are for informational purposes only.

Measurement of retaining wall backfill in embankment areas is paid for as embankment unless otherwise shown on the plans. Limits of measurement for embankment in retaining wall areas are shown on the plans.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Embankment (Final)," "Embankment (Original)," or "Embankment (Vehicle)" of the compaction method and type specified. This price is full compensation for furnishing embankment; hauling; placing, compacting, finishing, and reworking; disposal of waste material; and equipment, labor, tools, and incidentals.

When proof rolling is directed, it will be paid for in accordance with Item 216, "Proof Rolling."

All sprinkling and rolling, except proof rolling, will not be paid for directly but will be considered subsidiary to this Item, unless otherwise shown on the plans.

Where subgrade is constructed under this Contract, correction of soft spots in the subgrade will be at the Contractor's expense. Where subgrade is not constructed under this Contract, correction of soft spots in the subgrade will be paid in accordance with Article 9.7., "Payment for Extra Work and Force Account Method."

Item 260

Lime Treatment (Road-Mixed)

1. DESCRIPTION

Mix and compact lime, water, and subgrade or base (with or without asphaltic concrete pavement) in the roadway.

2. MATERIALS

Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications. Notify the Engineer of the proposed material sources and of changes to material sources. Obtain verification from the Engineer that the specification requirements are met before using the sources. The Engineer may sample and test project materials at any time before compaction. Use [Tex-100-E](#) for material definitions.

- 2.1. **Lime.** Furnish lime that meets the requirements of [DMS-6350](#), "Lime and Lime Slurry," and [DMS-6330](#), "Pre- Qualification of Lime Sources." Use hydrated lime, commercial lime slurry, quicklime, or carbide lime slurry as shown on the plans. Do not use quicklime when sulfates are present in quantities greater than 3,000 ppm. When furnishing quicklime, provide it in bulk.
- 2.2. **Subgrade.** The Engineer will determine the sulfate content of the existing subgrade in accordance with [Tex-145-E](#) and organic content in accordance with [Tex-148-E](#) before lime treatment begins. Suspend operations when material to be treated has a sulfate content greater than 7,000 ppm or an organic content greater than 1.0% and proceed as directed.
- 2.3. **Flexible Base.** Unless otherwise shown on the plans, furnish base material that meets the requirements of Item 247, "Flexible Base," for the type and grade shown on the plans, before the addition of lime.
- 2.4. **Water.** Furnish water free of industrial wastes and other objectionable material.
- 2.5. **Asphalt.** When asphalt or emulsion is permitted for curing purposes, furnish materials that meet the requirements of Item 300, "Asphalts, Oils, and Emulsions," as shown on the plans or as directed.
- 2.6. **Mix Design.** The Engineer will determine the target lime content and optimum moisture content in accordance with [Tex-121-E](#) or prior experience with the project materials. The Contractor may propose a mix design developed in accordance with [Tex-121-E](#). The Engineer will use [Tex-121-E](#) to verify the Contractor's proposed mix design before acceptance. Reimburse the Department for subsequent mix designs or partial designs necessitated by changes in the material or requests by the Contractor. Limit the amount of recycled asphalt pavement to no more than 50% of the mix unless otherwise shown on the plans or directed.

3. EQUIPMENT

Provide machinery, tools, and equipment necessary for proper execution of the work. Provide rollers in accordance with Item 210, "Rolling." Provide proof rollers in accordance with Item 216, "Proof Rolling," when required.

- 3.1. **Storage Facility.** Store quicklime and dry hydrated lime in closed, weatherproof containers.

- 3.2. **Slurry Equipment.** Use slurry tanks equipped with agitation devices to slurry hydrated lime or quicklime on the project or other approved location. The Engineer may approve other slurring methods.
- 3.3. Provide a pump for agitating the slurry when the distributor truck is not equipped with an agitator. Equip the distributor truck with a sampling device in accordance with [Tex-600-J](#), Part I, when using commercial lime slurry or carbide lime slurry.
- 3.4. **Hydrated Lime Distribution Equipment.** Provide equipment to spread lime evenly across the area to be treated. Provide equipment with a rotary vane feeder to spread lime, when shown on the plans.
- 3.5. **Pulverization Equipment.** Provide pulverization equipment that:
- cuts and pulverizes material uniformly to the proper depth with cutters that plane to a uniform surface over the entire width of the cut,
 - provides a visible indication of the depth of cut at all times, and
 - uniformly mixes the materials.

4. CONSTRUCTION

Construct each layer uniformly, free of loose or segregated areas, and with the required density and moisture content. Provide a smooth surface that conforms to the typical sections, lines, and grades shown on the plans or as directed.

- 4.1. **Preparation of Subgrade or Existing Base for Treatment.** Before treating, remove existing asphalt pavement in accordance with Item 105, "Removing Treated and Untreated Base and Asphalt Pavement," when shown on the plans or as directed. Shape existing material in accordance with applicable bid items to conform to typical sections shown on the plans and as directed.

Unless otherwise approved, proof roll the roadbed in accordance with Item 216, "Proof Rolling," before pulverizing or scarifying existing material. Correct soft spots as directed.

When material is imported from a borrow source, notify the Engineer of the location of the borrow source well in advance to allow time for testing and approval to avoid delay to the project. Stockpile as directed. The Engineer will test the borrow source and determine the sulfate and organic contents. When the borrow source has a sulfate content greater than 3,000 ppm or an organic content greater than 1.0%, proceed as directed.

When new base material is required to be mixed with existing base, deliver, place, and spread the new material in the required amount per station. Manipulate and thoroughly mix new base with existing material to provide a uniform mixture to the specified depth before shaping.

- 4.2. **Pulverization.** Pulverize or scarify existing material after shaping so that 100% passes a 2-1/2 in. sieve. If the material cannot be uniformly processed to the required depth in a single pass, excavate and windrow the material to expose a secondary grade to achieve processing to plan depth.

- 4.3. **Application of Lime.** Uniformly apply lime using dry or slurry placement as shown on the plans or as directed. Add lime at the percentage determined in Section 260.2.6., "Mix Design." Apply lime only on an area where mixing can be completed during the same working day.

Start lime application only when the air temperature is at least 35°F and rising or is at least 40°F. The temperature will be taken in the shade and away from artificial heat. Suspend application when the Engineer determines that weather conditions are unsuitable.

Minimize dust and scattering of lime by wind. Do not apply lime when wind conditions, in the opinion of the Engineer, cause blowing lime to become dangerous to traffic or objectionable to adjacent property owners. When pebble grade quicklime is placed dry, mix the material and lime thoroughly at the time of

lime application. Use of quicklime can be dangerous. Inform users of the recommended precautions for handling and storage.

4.3.1. **Dry Placement.** Before applying lime, bring the prepared roadway to approximately 2 percentage points above optimum moisture content. When necessary, sprinkle in accordance with Item 204, "Sprinkling." Distribute the required quantity of hydrated lime or pebble grade quicklime with approved equipment. Only hydrated lime may be distributed by bag. Do not use a motor grader to spread hydrated lime.

4.3.2. **Slurry Placement.** Provide slurry free of objectionable materials, at or above the minimum dry solids content, and with a uniform consistency that will allow ease of handling and uniform application. Deliver commercial lime slurry or carbide lime slurry to the jobsite, or use hydrated lime or quicklime to prepare lime slurry at the jobsite or other approved location, as specified. When dry quicklime is applied as slurry, use 80% of the amount shown on the plans.

Distribute slurry uniformly by making successive passes over a measured section of roadway until the specified lime content is reached. Uniformly spread the residue from quicklime slurry over the length of the roadway being processed, unless otherwise directed.

4.4. **Mixing.** Begin mixing within 6 hr. of application of lime. Hydrated lime exposed to the open air for 6 hr. or more between application and mixing, or that experiences excessive loss due to washing or blowing, will not be accepted for payment.

Thoroughly mix the material and lime using approved equipment. When treating subgrade, bring the moisture content above the optimum moisture content to insure adequate chemical reaction of the lime and subgrade materials. Allow the mixture to mellow for 1 to 4 days, as directed. When pebble grade quicklime is used, allow the mixture to mellow for 2 to 4 days, as directed. Sprinkle the treated materials during the mixing and mellowing operation, as directed, to achieve adequate hydration and proper moisture content. When the material to be treated has a sulfate content greater than 3,000 ppm but less than or equal to 7,000 ppm, mellow for a minimum of 7 days. Maintain in a continuously moist condition by sprinkling in accordance with Item 204, "Sprinkling." After mellowing, resume mixing until a homogeneous, friable mixture is obtained. After mixing, the Engineer may sample the mixture at roadway moisture and test in accordance with [Tex-101-E](#), Part III, to determine compliance with the gradation requirements in Table 1.

Table 1
Gradation Requirements (Minimum % Passing)

Sieve Size	Base	Subgrade
1-3/4"	100	100
3/4"	85	85
#4	—	60

4.5. **Compaction.** Compact the mixture using density control, unless otherwise shown on the plans. Multiple lifts are permitted when shown on the plans or approved. Bring each layer to the moisture content directed. Sprinkle the treated material in accordance with Item 204, "Sprinkling" or aerate the treated material to adjust the moisture content during compaction so that it is no more than 1.0 percentage points below optimum and 2.0 percentage points above optimum as determined by [Tex-121-E](#). Measure the moisture content of the material in accordance with [Tex-115-E](#) or [Tex-103-E](#) during compaction daily and report the results the same day, unless otherwise shown on the plans or directed.

Begin rolling longitudinally at the sides and proceed toward the center, overlapping on successive trips by at least 1/2 the width of the roller unit. On superelevated curves, begin rolling at the low side and progress toward the high side. Offset alternate trips of the roller. Operate rollers at a speed between 2 and 6 mph as directed.

Before final acceptance, the Engineer will select the locations of tests in each unit and measure the treated depth in accordance with [Tex-140-E](#). Correct areas deficient by more than 1/2 in. in thickness or more than

1/2% in target lime content by adding lime as required, reshaping, recompacting, and refinishing at the Contractor's expense.

Rework, recompact, and refinish material that fails to meet or that loses required moisture, density, stability, or finish before the next course is placed or the project is accepted. Continue work until specification requirements are met. Rework in accordance with Section 260.4.6., "Reworking a Section." Perform the work at no additional expense to the Department.

- 4.5.1. **Ordinary Compaction.** Roll with approved compaction equipment, as directed. Correct irregularities, depressions, and weak spots immediately by scarifying the areas affected, adding or removing treated material as required, reshaping, and recompacting.
- 4.5.2. **Density Control.** The Engineer will determine roadway density and moisture content of completed sections in accordance with [Tex-115-E](#). The Engineer may accept the section if no more than 1 of the 5 most recent density tests is below the specified density and the failing test is no more than 3 pcf below the specified density.
 - 4.5.2.1. **Subgrade.** Compact to at least 95% of the maximum density determined in accordance with [Tex-121-E](#), unless otherwise shown on the plans.
 - 4.5.2.2. **Base.** Compact the bottom course to at least 95% of the maximum density determined in accordance with [Tex-121-E](#), unless otherwise shown on the plans. Compact subsequent courses treated under this Item to at least 98% of the maximum density determined in accordance with [Tex-121-E](#), unless otherwise shown on the plans.
- 4.6. **Reworking a Section.** When a section is reworked within 72 hr. after completion of compaction, rework the section to provide the required density. When a section is reworked more than 72 hr. after completion of compaction, add additional lime at 25% of the percentage determined in Section 260.2.6., "Mix Design." Reworking includes loosening, adding material or removing unacceptable material if necessary, mixing as directed, compacting, and finishing. When density control is specified, determine a new maximum density of the reworked material in accordance with [Tex-121-E](#), and compact to at least 95% of this density.
- 4.7. **Finishing.** Immediately after completing compaction of the final course, clip, skin, or tight-blade the surface of the lime-treated material with a maintainer or subgrade trimmer to a depth of approximately 1/4 in. Remove loosened material and dispose of at an approved location. Roll the clipped surface immediately with a pneumatic tire roller until a smooth surface is attained. Add small amounts of water as needed during rolling. Shape and maintain the course and surface in conformity with the typical sections, lines, and grades shown on the plans or as directed.

Finish grade of constructed subgrade to within 0.1 ft. in the cross-section and 0.1 ft. in 16 ft. measured longitudinally.

Correct grade deviations of constructed base greater than 1/4 in. in 16 ft. measured longitudinally or greater than 1/4 in. over the entire width of the cross-section in areas where surfacing is to be placed. Remove excess material, reshape, and roll with a pneumatic-tire roller. Correct as directed if material is more than 1/4 in. low. Do not surface patch. The 72-hr. time limit required for completion of placement, compaction, and finishing does not apply to finishing required just before applying the surface course.
- 4.8. **Curing.** Cure for the minimum number of days shown in Table 2 by sprinkling in accordance with Item 204, "Sprinkling," or by applying an asphalt material at a rate of 0.05 to 0.20 gal. per square yard as directed. Maintain moisture during curing. Upon completion of curing, maintain the moisture content in accordance with Section 132.3.5., "Maintenance of Moisture and Reworking," for subgrade and Section 247.4.5., "Curing" for bases before placing subsequent courses. Do not allow equipment on the finished course during curing except as required for sprinkling, unless otherwise approved. Apply seals or additional courses within 14 calendar days of final compaction.

Table 2
Minimum Curing Requirement before Placing Subsequent Courses¹

Untreated Material	Curing (Days)
PI ≤ 35	2
PI > 35	5

1. Subject to the approval of the Engineer. Proof rolling may be required as an indicator of adequate curing.

5. MEASUREMENT

5.1. **Lime.** When lime is furnished in trucks, the weight of lime will be determined on certified scales, or the Contractor must provide a set of standard platform truck scales at a location approved by the Engineer. Scales must conform to the requirements of Item 520, "Weighing and Measuring Equipment."

When lime is furnished in bags, indicate the manufacturer's certified weight. Bags varying more than 5% from that weight may be rejected. The average weight of bags in any shipment, as determined by weighing 10 bags taken at random, must be at least the manufacturer's certified weight.

5.1.1. **Hydrated Lime.**

5.1.1.1. **Dry.** Lime will be measured by the ton (dry weight).

5.1.1.2. **Slurry.** Lime slurry will be measured by the ton (dry weight) of the hydrated lime used to prepare the slurry at the jobsite.

5.1.2. **Commercial Lime Slurry.** Lime slurry will be measured by the ton (dry weight) as calculated from the minimum percent dry solids content of the slurry, multiplied by the weight of the slurry in tons delivered.

5.1.3. **Quicklime.**

5.1.3.1. **Dry.** Lime will be measured by the ton (dry weight) of the quicklime.

5.1.3.2. **Slurry.** Lime slurry will be measured by the ton (dry weight) of the quicklime used to prepare the slurry multiplied by a conversion factor of 1.28 to give the quantity of equivalent hydrated lime, which will be the basis of payment.

5.1.4. **Carbide Lime Slurry.** Lime slurry will be measured by the ton (dry weight) as calculated from the minimum percent dry solids content of the slurry, multiplied by the weight of the slurry in tons delivered.

5.2. **Lime Treatment.** Lime treatment will be measured by the square yard of surface area. The dimensions for determining the surface area are established by the widths shown on the plans and the lengths measured at placement.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid in accordance with Section 260.6.1., "Lime," and Section 260.6.2., "Lime Treatment."

Furnishing and delivering new base will be paid for in accordance with Section 247.6.2., "Flexible Base (Roadway Delivery)." Mixing, spreading, blading, shaping, compacting, and finishing new or existing base material will be paid for in accordance with Section 260.6.2., "Lime Treatment."

Removal and disposal of existing asphalt concrete pavement will be paid for in accordance with pertinent Items or Article 4.4., "Changes in the Work."

Sprinkling and rolling, except proof rolling, will not be paid for directly but will be subsidiary to this Item, unless otherwise shown on the plans. When proof rolling is shown on the plans or directed by the Engineer, it will be paid for in accordance with Item 216, "Proof Rolling."

Where subgrade is constructed under this Contract, correction of soft spots in the subgrade or existing base will be at the Contractor's expense. Where subgrade is not constructed under this Contract, correction of soft spots in the subgrade or existing base will be paid for in accordance with pertinent Items or Article 4.4., "Changes in the Work."

Where subgrade to be treated under this Contract has sulfates greater than 7,000 ppm, work will be paid for in accordance with Article 4.4., "Changes in the Work."

Asphalt used solely for curing will not be paid for directly but will be subsidiary to this Item. Asphalt placed for curing and priming will be paid for under Item 310, "Prime Coat."

6.1. **Lime.** Lime will be paid for at the unit price bid for "Lime" of one of the following types:

- Hydrated Lime (Dry),
- Hydrated Lime (Slurry),
- Commercial Lime Slurry,
- Quicklime (Dry),
- Quicklime (Slurry), or
- Carbide Lime Slurry.

This price is full compensation for materials, delivery, equipment, labor, tools, and incidentals.

Lime used for reworking a section in accordance with Section 260.4.6., "Reworking a Section," will not be paid for directly but will be subsidiary to this Item.

6.2. **Lime Treatment.** Lime treatment will be paid for at the unit price bid for "Lime Treatment (Existing Material)," "Lime Treatment (New Base)," or "Lime Treatment (Mixing Existing Material and New Base)," for the depth specified. No payment will be made for thickness or width exceeding that shown on the plans. This price is full compensation for shaping existing material, loosening, mixing, pulverizing, spreading, applying lime, compacting, finishing, curing, curing materials, blading, shaping and maintaining shape, replacing mixture, disposing of loosened materials, processing, hauling, preparing secondary subgrade, water, equipment, labor, tools, and incidentals.

Item 360

Concrete Pavement

1. DESCRIPTION

Construct hydraulic cement concrete pavement with or without curbs on the concrete pavement.

2. MATERIALS

- 2.1. **Hydraulic Cement Concrete.** Provide hydraulic cement concrete in accordance with Item 421, "Hydraulic Cement Concrete." Use compressive strength testing unless otherwise shown on the plans. Provide Class P concrete designed to meet a minimum average compressive strength of 3,200 psi or a minimum average flexural strength of 450 psi at 7 days or a minimum average compressive strength of 4,000 psi or a minimum average flexural strength of 570 psi at 28 days. Test in accordance with [Tex-448-A](#) or [Tex-418-A](#).

Obtain written approval if the concrete mix design exceeds 520 lb. per cubic yard of cementitious material.

Use coarse aggregates for continuously reinforced concrete pavements to produce concrete with a coefficient of thermal expansion not more than 5.5×10^{-6} in./in./°F. Provide satisfactory [Tex-428-A](#) test data from an approved testing laboratory if the coarse aggregate coefficient of thermal expansion listed on the Department's *Concrete Rated Source Quality Catalog* is not equal to or less than 5.5×10^{-6} in./in./°F.

Provide Class HES concrete for very early opening of small pavement areas or leave-outs to traffic when shown on the plans or allowed. Design Class HES to meet the requirements of Class P and a minimum average compressive strength of 3,200 psi or a minimum average flexural strength of 450 psi in 24 hr., unless other early strength and time requirements are shown on the plans or allowed.

Use Class A or P concrete meeting the requirements of Item 421, "Hydraulic Cement Concrete," and this Item for curbs that are placed separately from the pavement.

- 2.2. **Reinforcing Steel.** Provide Grade 60 or above, deformed steel for bar reinforcement in accordance with Item 440, "Reinforcement for Concrete." Provide positioning and supporting devices (baskets and chairs) capable of securing and holding the reinforcing steel in proper position before and during paving. Provide corrosion protection when shown on the plans.

- 2.2.1. **Dowels.** Provide smooth, straight dowels of the size shown on the plans, free of burrs, and conforming to the requirements of Item 440, "Reinforcement for Concrete." Coat dowels with a thin film of grease, wax, silicone or other approved de-bonding material. Provide dowel caps on the lubricated end of each dowel bar used in an expansion joint. Provide dowel caps filled with a soft compressible material with enough range of movement to allow complete closure of the expansion joint.

- 2.2.2. **Tie Bars.** Provide straight deformed steel tie bars. Provide either multiple-piece tie bars or single-piece tie bars as shown on the plans. Furnish multiple piece tie bar assemblies from the list of approved multiple-piece tie bars that have been prequalified in accordance with DMS-4515, "Multiple Piece Tie Bars for Concrete Pavements," when used. Multiple-piece tie bars used on individual projects must be sampled in accordance with [Tex-711-I](#), and tested in accordance with DMS-4515 "Multiple Piece Tie Bars for Concrete Pavements."

- 2.3. **Alternative Reinforcing Materials.** Provide reinforcement materials of the dimensions and with the physical properties specified when allowed or required by the plans. Provide manufacturer's certification of required material properties.
- 2.4. **Curing Materials.** Provide Type 2 membrane curing compound conforming to [DMS-4650](#), "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants." Provide SS-1 emulsified asphalt conforming to Item 300, "Asphalts, Oils, and Emulsions," for concrete pavement to be overlaid with asphalt concrete under this Contract unless otherwise shown on the plans or approved. Provide materials for other methods of curing conforming to the requirements of Item 422, "Concrete Superstructures." Provide insulating blankets for curing fast track concrete pavement with a minimum thermal resistance (R) rating of 0.5 hour-square foot F/BTU. Use insulating blankets that are free from tears and are in good condition.
- 2.5. **Epoxy.** Provide Type III, Class C epoxy in accordance with [DMS-6100](#), "Epoxies and Adhesives," for installing all drilled-in reinforcing steel. Submit a work plan and request approval for the use of epoxy types other than Type III, Class C.
- 2.6. **Evaporation Retardant.** Provide evaporation retardant conforming to [DMS-4650](#), "Hydraulic Cement Concrete Curing Materials and Evaporation Retardants."
- 2.7. **Joint Sealants and Fillers.** Provide Class 5 or Class 8 joint-sealant materials and fillers unless otherwise shown on the plans or approved and other sealant materials of the size, shape, and type shown on the plans in accordance with [DMS-6310](#), "Joint Sealants and Fillers."

3. EQUIPMENT

Furnish and maintain all equipment in good working condition. Use measuring, mixing, and delivery equipment conforming to the requirements of Item 421, "Hydraulic Cement Concrete." Obtain approval for other equipment used.

- 3.1. **Placing, Consolidating, and Finishing Equipment.** Provide approved self-propelled paving equipment that uniformly distributes the concrete with minimal segregation and provides a smooth machine-finished consolidated concrete pavement conforming to plan line and grade. Provide an approved automatic grade control system on slip-forming equipment. Provide approved mechanically-operated finishing floats capable of producing a uniformly smooth pavement surface. Provide equipment capable of providing a fine, light water fog mist.

When string-less paving equipment is used, use Section 5.9.3, "Method C," and establish control points at maximum intervals of 500 ft. Use these control points as reference to perform the work.

Provide mechanically-operated vibratory equipment capable of adequately consolidating the concrete. Provide immersion vibrators on the paving equipment at sufficiently close intervals to provide uniform vibration and consolidation of the concrete over the entire width and depth of the pavement and in accordance with the manufacturer's recommendations. Provide immersion vibrator units that operate at a frequency in air of at least 8,000 cycles per minute. Provide enough hand-operated immersion vibrators for timely and proper consolidation of the concrete along forms, at all joints and in areas not covered by other vibratory equipment. Surface vibrators may be used to supplement equipment-mounted immersion vibrators. Provide tachometers to verify the proper operation of all vibrators.

For small or irregular areas or when approved, the paving equipment described in this Section is not required.

- 3.2. **Forming Equipment.**

- 3.2.1. **Pavement Forms.** Provide metal side forms of sufficient cross-section, strength, and rigidity to support the paving equipment and resist the impact and vibration of the operation without visible springing or

settlement. Use forms that are free from detrimental kinks, bends, or warps that could affect ride quality or alignment. Provide flexible or curved metal or wood forms for curves of 100-ft. radius or less.

- 3.2.2. **Curb Forms.** Provide curb forms for separately placed curbs that are not slipformed that conform to the requirements of Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- 3.3. **Reinforcing Steel Inserting Equipment.** Provide inserting equipment that accurately inserts and positions reinforcing steel in the plastic concrete parallel to the profile grade and horizontal alignment in accordance to plan details when approved.
- 3.4. **Texturing Equipment.**
 - 3.4.1. **Carpet Drag.** Provide a carpet drag mounted on a work bridge or a manual moveable support system. Provide a single piece of carpet of sufficient transverse length to span the full width of the pavement being placed and adjustable so that a sufficient longitudinal length of carpet is in contact with the concrete being placed to produce the desired texture. Obtain approval to vary the length and width of the carpet to accommodate specific applications.
 - 3.4.2. **Tining Equipment.** Provide a self-propelled metal tine device equipped with steel tines with cross-section approximately 1/32 in. thick × 1/12 in. wide. Provide tines for transverse tining equipment spaced at approximately 1 in., center-to-center, or provide tines for longitudinal tining equipment spaced at approximately 3/4 in., center-to-center. Manual methods that produce an equivalent texture may be used when it is impractical to use self-propelled equipment, such as for small areas, narrow width sections, and in emergencies due to equipment breakdown.
- 3.5. **Curing Equipment.** Provide a self-propelled machine for applying membrane curing compound using mechanically-pressurized spraying equipment with atomizing nozzles. Provide equipment and controls that maintain the required uniform rate of application over the entire paving area. Provide curing equipment that is independent of all other equipment when required to meet the requirements of Section 360.4.9., "Curing." Hand-operated pressurized spraying equipment with atomizing nozzles may only be used on small or irregular areas, narrow width sections, or in emergencies due to equipment breakdown.
- 3.6. **Sawing Equipment.** Provide power-driven concrete saws to saw the joints shown on the plans. Provide standby power-driven concrete saws during concrete sawing operations.
- 3.7. **Grinding Equipment.** Provide self-propelled powered grinding equipment that is specifically designed to smooth and texture concrete pavement using circular diamond blades when required. Provide equipment with automatic grade control capable of grinding at least a 3-ft. width longitudinally in each pass without damaging the concrete.
- 3.8. **Testing Equipment.** Provide testing equipment regardless of job-control testing responsibilities in accordance with Item 421, "Hydraulic Cement Concrete," unless otherwise shown on the plans or specified.
- 3.9. **Coring Equipment.** Provide coring equipment capable of extracting cores in accordance with the requirements of [Tex-424-A](#) when required.
- 3.10. **Miscellaneous Equipment.** Furnish both 10-ft. and 15-ft. steel or magnesium long-handled, standard straightedges. Furnish enough work bridges, long enough to span the pavement, for finishing and inspection operations.

4. CONSTRUCTION

Obtain approval for adjustments to plan grade-line to maintain thickness over minor subgrade or base high spots while maintaining clearances and drainage. Maintain subgrade or base in a smooth, clean,

compacted condition in conformity with the required section and established grade until the pavement concrete is placed. Keep subgrade or base damp with water before placing pavement concrete.

Adequately light the active work areas for all nighttime operations. Provide and maintain tools and materials to perform testing.

- 4.1. **Paving and Quality Control Plan.** Submit a paving and quality control plan for approval before beginning pavement construction operations. Include details of all operations in the concrete paving process, including methods to construct transverse joints, methods to consolidate concrete at joints, longitudinal construction joint layout, sequencing, curing, lighting, early opening, leave-outs, sawing, inspection, testing, construction methods, other details and description of all equipment. List certified personnel performing the testing. Submit revisions to the paving and quality control plan for approval.

- 4.2. **Job-Control Testing.** Perform all fresh and hardened concrete job-control testing at the specified frequency unless otherwise shown on the plans. Provide job-control testing personnel meeting the requirements of Item 421, "Hydraulic Cement Concrete." Provide and maintain testing equipment, including strength testing equipment at a location acceptable to the Engineer. Use of a commercial laboratory is acceptable. Maintain all testing equipment calibrated in accordance with pertinent test methods. Make strength-testing equipment available to the Engineer for verification testing.

Provide the Engineer the opportunity to witness all tests. The Engineer may require a retest if not given the opportunity to witness. Furnish a copy of all test results to the Engineer daily. Check the first few concrete loads for slump and temperature to verify concrete conformance and consistency on start-up production days. Sample and prepare strength-test specimens (2 specimens per test) on the first day of production and for each 3,000 sq. yd. or fraction thereof of concrete pavement thereafter. Prepare at least 1 set of strength-test specimens for each production day. Perform slump and temperature tests each time strength specimens are made. Monitor concrete temperature to ensure that concrete is consistently within the temperature requirements. The Engineer will direct random job-control sampling and testing. Immediately investigate and take corrective action as approved if any Contractor test result, including tests performed for verification purposes, does not meet specification requirements.

The Engineer will perform job-control testing when the testing by the Contractor is waived by the plans; however, this does not waive the Contractor's responsibility for providing materials and work in accordance with this Item.

- 4.2.1. **Job-Control Strength.** Use 7-day job-control concrete strength testing in accordance with [Tex-448-A](#) or [Tex-418-A](#) unless otherwise shown on the plans or permitted.

Use a compressive strength of 3,200 psi or a lower job-control strength value proven to meet a 28-day compressive strength of 4,000 psi as correlated in accordance with [Tex-427-A](#) for 7-day job-control by compressive strength. Use a flexural strength of 450 psi or a lower job-control strength value proven to meet a 28-day flexural strength of 570 psi as correlated in accordance with [Tex-427-A](#) for 7-day job-control by flexural strength.

Job control of concrete strength may be correlated to an age other than 7 days in accordance with [Tex-427-A](#) when approved. Job-control strength of Class HES concrete is based on the required strength and time.

Investigate the strength test procedures, the quality of materials, the concrete production operations, and other possible problem areas to determine the cause when a job-control concrete strength test value is more than 10% below the required job-control strength or when 3 consecutive job-control strength values fall below the required job-control strength. Take necessary action to correct the problem, including redesign of the concrete mix if needed. The Engineer may suspend concrete paving if the Contractor is unable to identify, document, and correct the cause of low-strength test values in a timely manner. The Engineer will evaluate the structural adequacy of the pavements if any job-control strength is more than 15% below the required job-control strength. Remove and replace pavements found to be structurally inadequate at no additional cost when directed.

- 4.2.2. **Split-Sample Verification Testing.** Perform split-sample verification testing with the Engineer on random samples taken and split by the Engineer at a rate of at least 1 for every 10 job-control samples. The Engineer will evaluate the results of split-sample verification testing. Immediately investigate and take corrective action as approved when results of split-sample verification testing differ more than the allowable differences shown in Table 1, or the average of 10 job-control strength results and the Engineer’s split-sample strength result differ by more than 10%.

**Table 1
Verification Testing Limits**

Test Method	Allowable Differences
Temperature, Tex-422-A	2°F
Flexural strength, Tex-448-A	19%
Compressive strength, Tex-418-A	10%

- 4.3. **Reinforcing Steel and Joint Assemblies.** Accurately place and secure in position all reinforcing steel as shown on the plans. Place dowels at mid-depth of the pavement slab, parallel to the surface. Place dowels for transverse contraction joints parallel to the pavement edge. Tolerances for location and alignment of dowels will be shown on the plans. Stagger the lap locations so that no more than 1/3 of the longitudinal steel is spliced in any given 12-ft. width and 2-ft. length of the pavement. Use multiple-piece tie bars, drill and epoxy grout tie bars, or, if approved, mechanically-inserted single-piece tie bars at longitudinal construction joints. Verify that tie bars that are drilled and epoxied or mechanically inserted into concrete at longitudinal construction joints develop a pullout resistance equal to a minimum of 3/4 of the yield strength of the steel after 7 days. Test 15 bars using ASTM E488, except that alternate approved equipment may be used. All 15 tested bars must meet the required pullout strength. Perform corrective measures to provide equivalent pullout resistance if any of the test results do not meet the required minimum pullout strength. Repair damage from testing. Acceptable corrective measures include but are not limited to installation of additional or longer tie bars.
- 4.3.1. **Manual Placement.** Secure reinforcing bars at alternate intersections with wire ties or locking support chairs. Tie all splices with wire.
- 4.3.2. **Mechanical Placement.** Complete the work using manual placement methods described above if mechanical placement of reinforcement results in steel misalignment or improper location, poor concrete consolidation, or other inadequacies.
- 4.4. **Joints.** Install joints as shown on the plans. Joint sealants are not required on concrete pavement that is to be overlaid with asphaltic materials. Clean and seal joints in accordance with Item 438, “Cleaning and Sealing Joints.” Repair excessive spalling of the joint saw groove using an approved method before installing the sealant. Seal all joints before opening the pavement to all traffic. Install a rigid transverse bulkhead, for the reinforcing steel, and shaped accurately to the cross-section of the pavement when placing of concrete is stopped.
- 4.4.1. **Placing Reinforcement at Joints.** Complete and place the assembly of parts at pavement joints at the required location and elevation, with all parts rigidly secured in the required position, when shown on the plans.
- 4.4.2. **Transverse Construction Joints.**
- 4.4.2.1. **Continuously Reinforced Concrete Pavement (CRCP).** Install additional longitudinal reinforcement through the bulkhead when shown on the plans. Protect the reinforcing steel immediately beyond the construction joint from damage, vibration, and impact.
- 4.4.2.2. **Concrete Pavement Contraction Design (CPCD).** Install and rigidly secure a complete joint assembly and bulkhead in the planned transverse contraction joint location when the placing of concrete is intentionally stopped. Install a transverse construction joint either at a planned transverse contraction joint location or mid- slab between planned transverse contraction joints when the placing of concrete is unintentionally stopped. Install tie bars of the size and spacing used in the longitudinal joints for mid-slab construction joints.

4.4.2.3. **Curb Joints.** Provide joints in the curb of the same type and location as the adjacent pavement. Use expansion joint material of the same thickness, type, and quality required for the pavement and of the section shown for the curb. Extend expansion joints through the curb. Construct curb joints at all transverse pavement joints. Place reinforcing steel into the plastic concrete pavement for non-monolithic curbs as shown on the plans unless otherwise approved. Form or saw the weakened plane joint across the full width of concrete pavement and through the monolithic curbs. Construct curb joints in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."

4.5. **Placing and Removing Forms.** Use clean and oiled forms. Secure forms on a base or firm subgrade that is accurately graded and that provides stable support without deflection and movement by form riding equipment. Pin every form at least at the middle and near each end. Tightly join and key form sections together to prevent relative displacement.

Set side forms far enough in advance of concrete placement to permit inspection. Check conformity of the grade, alignment, and stability of forms immediately before placing concrete, and make all necessary corrections. Use a straightedge or other approved method to test the top of forms to ensure that the ride quality requirements for the completed pavement will be met. Stop paving operations if forms settle or deflect more than 1/8 in. under finishing operations. Reset forms to line and grade, and refinish the concrete surface to correct grade.

Avoid damage to the edge of the pavement when removing forms. Repair damage resulting from form removal and honeycombed areas with a mortar mix within 24 hr. after form removal unless otherwise approved. Clean joint face and repair honeycombed or damaged areas within 24 hr. after a bulkhead for a transverse construction joint has been removed unless otherwise approved. Promptly apply membrane curing compound to the edge of the concrete pavement when forms are removed before 72 hr. after concrete placement.

Forms that are not the same depth as the pavement, but are within 2 in. of that depth are permitted if the subbase is trenched or the full width and length of the form base is supported with a firm material to produce the required pavement thickness. Promptly repair the form trench after use. Use flexible or curved wood or metal forms for curves of 100-ft. radius or less.

4.6. **Concrete Delivery.** Clean delivery equipment as necessary to prevent accumulation of old concrete before loading fresh concrete. Use agitated delivery equipment for concrete designed to have a slump of more than 5 in. Segregated concrete is subject to rejection.

Begin the discharge of concrete delivered in agitated delivery equipment conforming to the requirements of Item 421, "Hydraulic Cement Concrete." Place non-agitated concrete within 45 min. after batching. Reduce times as directed when hot weather or other conditions cause quick setting of the concrete.

4.7. **Concrete Placement.** Do not allow the pavement edge to deviate from the established paving line by more than 1/2 in. at any point. Place the concrete as near as possible to its final location, and minimize segregation and rehandling. Distribute concrete using shovels where hand spreading is necessary. Do not use rakes or vibrators to distribute concrete.

4.7.1. **Consolidation.** Consolidate all concrete by approved mechanical vibrators operated on the front of the paving equipment. Use immersion-type vibrators that simultaneously consolidate the full width of the placement when machine finishing. Keep vibrators from dislodging reinforcement. Use hand-operated vibrators to consolidate concrete along forms, at all joints and in areas not accessible to the machine-mounted vibrators. Do not operate machine-mounted vibrators while the paving equipment is stationary. Vibrator operations are subject to review.

4.7.2. **Curbs.** Conform to the requirements of Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter" where curbs are placed separately.

- 4.7.3. **Temperature Restrictions.** Place concrete that is between 40°F and 95°F when measured in accordance with [Tex-422-A](#) at the time of discharge, except that concrete may be used if it was already in transit when the temperature was found to exceed the allowable maximum. Take immediate corrective action or cease concrete production when the concrete temperature exceeds 95°F.

Do not place concrete when the ambient temperature in the shade is below 40°F and falling unless approved. Concrete may be placed when the ambient temperature in the shade is above 35°F and rising or above 40°F. Protect the pavement with an approved insulating material capable of protecting the concrete for the specified curing period when temperatures warrant protection against freezing. Submit for approval proposed measures to protect the concrete from anticipated freezing weather for the first 72 hr. after placement. Repair or replace all concrete damaged by freezing.

- 4.8. **Spreading and Finishing.** Finish all concrete pavement with approved self-propelled equipment. Use power-driven spreaders, power-driven vibrators, power-driven strike-off, screed, or approved alternate equipment. Use the transverse finishing equipment to compact and strike-off the concrete to the required section and grade without surface voids. Use float equipment for final finishing. Use concrete with a consistency that allows completion of all finishing operations without addition of water to the surface. Use the minimal amount of water fog mist necessary to maintain a moist surface. Reduce fogging if float or straightedge operations result in excess slurry.

- 4.8.1. **Finished Surface.** Perform sufficient checks with long-handled 10-ft. and 15-ft. straightedges on the plastic concrete to ensure the final surface is within the tolerances specified in Surface Test A in Item 585, "Ride Quality for Pavement Surfaces." Check with the straightedge parallel to the centerline.

- 4.8.2. **Maintenance of Surface Moisture.** Prevent surface drying of the pavement before application of the curing system by means that may include water fogging, the use of wind screens, and the use of evaporation retardants. Apply evaporation retardant at the manufacturer's recommended rate. Reapply the evaporation retardant as needed to maintain the concrete surface in a moist condition until curing system is applied. Do not use evaporation retardant as a finishing aid. Failure to take acceptable precautions to prevent surface drying of the pavement will be cause for shutdown of pavement operations.

- 4.8.3. **Surface Texturing.** Complete final texturing before the concrete has attained its initial set. Drag the carpet longitudinally along the pavement surface with the carpet contact surface area adjusted to provide a satisfactory coarsely textured surface. Prevent the carpet from getting plugged with grout. Do not perform carpet dragging operations while there is excessive bleed water.

A metal-tine texture finish is required unless otherwise shown on the plans. Provide transverse tining unless otherwise shown on the plans. Immediately following the carpet drag, apply a single coat of evaporation retardant, if needed, at the rate recommended by the manufacturer. Provide the metal-tine finish immediately after the concrete surface has set enough for consistent tining. Operate the metal-tine device to obtain grooves approximately 3/16 in. deep, with a minimum depth of 1/8 in., and approximately 1/12 in. wide. Do not overlap a previously tined area. Use manual methods to achieve similar results on ramps, small or irregular areas, and narrow width sections of pavements. Repair damage to the edge of the slab and joints immediately after texturing. Do not tine pavement that will be overlaid or that is scheduled for blanket diamond grinding or shot blasting.

Target a carpet drag texture of 0.04 in., as measured by [Tex-436-A](#), when carpet drag is the only surface texture required on the plans. Ensure adequate and consistent macro-texture is achieved by applying enough weight to the carpet and by keeping the carpet from getting plugged with grout. Correct any location with a texture less than 0.03 in. by diamond grinding or shot blasting. The Engineer will determine the test locations at points located transversely to the direction of traffic in the outside wheel path.

- 4.8.4. **Small, Irregular Area, or Narrow Width Placements.** Use hand equipment and procedures that produce a consolidated and finished pavement section to the line and grade where machine placements and finishing of concrete pavement are not practical.

- 4.8.5. **Emergency Procedures.** Use hand-operated equipment for applying texture, evaporation retardant, and cure in the event of equipment breakdown.
- 4.9. **Curing.** Keep the concrete pavement surface from drying as described in Section 360.4.8.2., "Maintenance of Surface Moisture," until the curing material has been applied. Maintain and promptly repair damage to curing materials on exposed surfaces of concrete pavement continuously for at least 3 curing days. A curing day is defined as a 24-hr. period when either the temperature taken in the shade away from artificial heat is above 50°F for at least 19 hr. or the surface temperature of the concrete is maintained above 40°F for 24 hr.
- Curing begins when the concrete curing system has been applied. Stop concrete paving if curing compound is not being applied promptly and maintained adequately. Other methods of curing in accordance with Item 422, "Concrete Superstructures," may be used when specified or approved.
- 4.9.1. **Membrane Curing.** Spray the concrete surface uniformly with 2 coats of membrane curing compound at an individual application rate of no more than 180 sq. ft. per gallon. Apply the curing compound before allowing the concrete surface to dry.
- Manage finishing and texturing operations to ensure placement of curing compound on a moist concrete surface, relatively free of bleed water, to prevent any plastic shrinkage cracking. Time the application of curing compound to prevent plastic shrinkage cracking.
- Maintain curing compounds in a uniformly agitated condition, free of settlement before and during application. Do not thin or dilute the curing compound.
- Apply additional compound at the same rate of coverage to correct damage where the coating shows discontinuities or other defects or if rain falls on the newly coated surface before the film has dried enough to resist damage. Ensure that the curing compound coats the sides of the tining grooves.
- 4.9.2. **Asphalt Curing.** Apply a uniform coating of asphalt curing at a rate of 90 to 180 sq. ft. per gallon when an asphaltic concrete overlay is required. Apply curing immediately after texturing and once the free moisture (sheen) has disappeared. Obtain approval to add water to the emulsion to improve spray distribution. Maintain the asphalt application rate when using diluted emulsions. Maintain the emulsion in a mixed condition during application.
- 4.9.3. **Curing Class HES Concrete.** Provide membrane curing in accordance with Section 360.4.9.1., "Membrane Curing," for all Class HES concrete pavement. Promptly follow by wet mat curing in accordance with Section 422.4.8., "Final Curing," until opening strength is achieved but not less than 24 hr.
- 4.9.4. **Curing Fast-Track Concrete Pavement.** Provide wet mat curing unless otherwise shown on the plans or as directed. Cure in accordance with Section 422.4.8., "Final Curing." Apply a Type 1-D or Type 2 membrane cure instead of wet mat curing if the air temperature is below 65°F and insulating blankets are used.
- 4.10. **Sawing Joints.** Saw joints to the depth shown on the plans as soon as sawing can be accomplished without damage to the pavement regardless of time of day or weather conditions. Some minor raveling of the saw-cut is acceptable. Use a chalk line, string line, sawing template, or other approved method to provide a true joint alignment. Provide enough saws to match the paving production rate to ensure sawing completion at the earliest possible time to avoid uncontrolled cracking. Reduce paving production if necessary to ensure timely sawing of joints. Promptly restore membrane cure damaged within the first 72 hr. of curing.
- 4.11. **Protection of Pavement and Opening to Traffic.** Testing for early opening is the responsibility of the Contractor regardless of job-control testing responsibilities unless otherwise shown on the plans or as directed. Testing result interpretation for opening to traffic is subject to approval.

- 4.11.1. **Protection of Pavement.** Erect and maintain barricades and other standard and approved devices that will exclude all vehicles and equipment from the newly placed pavement for the periods specified. Protect the pavement from damage due to crossings using approved methods before opening to traffic. Where a detour is not readily available or economically feasible, an occasional crossing of the roadway with overweight equipment may be permitted for relocating equipment only but not for hauling material. When an occasional crossing of overweight equipment is permitted, temporary matting or other approved methods may be required.

Maintain an adequate supply of sheeting or other material to cover and protect fresh concrete surface from weather damage. Apply as needed to protect the pavement surface from weather.

- 4.11.2. **Opening Pavement to All Traffic.** Pavement that is 7 days old may be opened to all traffic. Clean pavement, place stable material against the pavement edges, seal joints, and perform all other traffic safety related work before opening to traffic.

- 4.11.3. **Opening Pavement to Construction Equipment.** Unless otherwise shown on the plans, concrete pavement may be opened early to concrete paving equipment and related delivery equipment after the concrete is at least 48 hr. old and opening strength has been demonstrated in accordance with Section 360.4.11.4., "Early Opening to All Traffic," before curing is complete. Keep delivery equipment at least 2 ft. from the edge of the concrete pavement. Keep tracks of the paving equipment at least 1 ft. from the pavement edge. Protect textured surfaces from the paving equipment. Restore damaged membrane curing as soon as possible. Repair pavement damaged by paving or delivery equipment before opening to all traffic.

- 4.11.4. **Early Opening to All Traffic.** Concrete pavement may be opened after curing is complete and the concrete has attained a flexural strength of 450 psi or a compressive strength of 3,200 psi, except that pavement using Class HES concrete may be opened after 24 hr. if the specified strength is achieved.

- 4.11.4.1. **Strength Testing.** Test concrete specimens cured under the same conditions as the portion of the pavement involved.

- 4.11.4.2. **Maturity Method.** Use the maturity method, [Tex-426-A](#), to estimate concrete strength for early opening pavement to traffic unless otherwise shown on the plans. Install at least 2 maturity sensors for each day's placement in areas where the maturity method will be used for early opening. Maturity sensors, when used, will be installed near the day's final placement for areas being evaluated for early opening. Use test specimens to verify the strength–maturity relationship in accordance with [Tex-426-A](#), starting with the first day's placement corresponding to the early opening pavement section.

Verify the strength–maturity relationship at least every 10 days of production after the first day. Establish a new strength–maturity relationship when the strength specimens deviate more than 10% from the maturity- estimated strengths. Suspend use of the maturity method for opening pavements to traffic when the strength–maturity relationship deviates by more than 10% until a new strength–maturity relationship is established.

The Engineer will determine the frequency of verification when the maturity method is used intermittently or for only specific areas.

- 4.11.5. **Fast Track Concrete Pavement.** Open the pavement after the concrete has been cured for at least 8 hr. and attained a minimum compressive strength of 1,800 psi or a minimum flexural strength of 255 psi when tested in accordance with Section 360.4.11.4.1., "Strength Testing," or Section 360.4.11.4.2., "Maturity Method," unless otherwise directed. Cover the pavement with insulating blankets when the air temperature is below 65°F until the pavement is opened to traffic.

- 4.11.6. **Emergency Opening to Traffic.** Open the pavement to traffic under emergency conditions, when the pavement is at least 72 hr. old when directed in writing. Remove all obstructing materials, place stable

material against the pavement edges, and perform other work involved in providing for the safety of traffic as required for emergency opening.

4.12. **Pavement Thickness.** The Engineer will check the thickness in accordance with [Tex-423-A](#) unless other methods are shown on the plans. The Engineer will perform 1 thickness test consisting of 1 reading at approximately the center of the paving equipment every 500 ft. or fraction thereof. Core where directed, in accordance with [Tex-424-A](#), to verify deficiencies of more than 0.2 in. from plan thickness and to determine the limits of deficiencies of more than 0.75 in. from plan thickness. Fill core holes using an approved concrete mixture and method.

4.12.1. **Thickness Deficiencies Greater than 0.2 in.** Take one 4-in. diameter core at that location to verify the measurement when any depth test measured in accordance with [Tex-423-A](#) is deficient by more than 0.2 in. from the plan thickness.

Take 2 additional cores from the unit (as defined in Section 360.4.12.3., "Pavement Units for Payment Adjustment" at intervals of at least 150 ft. and at selected locations if the core is deficient by more than 0.2 in., but not by more than 0.75 in. from the plan thickness, and determine the thickness of the unit for payment purposes by averaging the length of the 3 cores. In calculations of the average thickness of this unit of pavement, measurements in excess of the specified thickness by more than 0.2 in. will be considered as the specified thickness plus 0.2 in.

4.12.2. **Thickness Deficiencies Greater than 0.75 in.** Take additional cores at 10-ft. intervals in each direction parallel to the centerline to determine the boundary of the deficient area if a core is deficient by more than 0.75 in. The Engineer will evaluate any area of pavement found deficient in thickness by more than 0.75 in., but not more than 1 in. Remove and replace the deficient areas without additional compensation or retain deficient areas without compensation, as directed. Remove and replace any area of pavement found deficient in thickness by more than 1 in. without additional compensation.

4.12.3. **Pavement Units for Payment Adjustment.** Limits for applying a payment adjustment for deficient pavement thickness from 0.20 in. to not more than 0.75 in. are 500 ft. of pavement in each lane. Lane width will be as shown on typical sections and pavement design standards.

For greater than 0.75 in. deficient thickness, the limits for applying zero payment or requiring removal will be defined by coring or equivalent nondestructive means as determined by the Engineer. The remaining portion of the unit determined to be less than 0.75 in. deficient will be subject to the payment adjustment based on the average core thickness at each end of the 10-ft. interval investigation as determined by the Engineer.

Shoulders will be measured for thickness unless otherwise shown on the plans. Shoulders 6 ft. wide or wider will be considered as lanes. Shoulders less than 6 ft. wide will be considered part of the adjacent lane.

Limits for applying payment adjustment for deficient pavement thickness for ramps, widenings, acceleration and deceleration lanes, and other miscellaneous areas are 500 ft. in length. Areas less than 500 ft. in length will be individually evaluated for payment adjustment based on the plan area.

4.13. **Ride Quality.** Measure ride quality in accordance with Item 585, "Ride Quality for Pavement Surfaces," unless otherwise shown on the plans.

5. MEASUREMENT

This Item will be measured as follows:

5.1. **Concrete Pavement.** Concrete pavement will be measured by the square yard of surface area in place. The surface area includes the portion of the pavement slab extending beneath the curb.

5.2. **Curb.** Curb on concrete pavement will be measured by the foot in place.

6. PAYMENT

These prices are full compensation for materials, equipment, labor, tools, and incidentals.

6.1. **Concrete Pavement.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the adjusted unit price bid for "Concrete Pavement" of the type and depth specified as adjusted in accordance with Section 360.6.2., "Deficient Thickness Adjustment."

6.2. **Deficient Thickness Adjustment.** Where the average thickness of pavement is deficient in thickness by more than 0.2 in. but not more than 0.75 in., payment will be made using the adjustment factor as specified in Table 2 applied to the bid price for the deficient area for each unit as defined under Section 360.4.12.3., "Pavement Units for Payment Adjustment."

**Table 2
Deficient Thickness Price Adjustment Factor**

Deficiency in Thickness Determined by Cores (in.)	Proportional Part of Contract Price Allowed (Adjustment Factor)
Not deficient	1.00
Over 0.00 through 0.20	1.00
Over 0.20 through 0.30	0.80
Over 0.30 through 0.40	0.72
Over 0.40 through 0.50	0.68
Over 0.50 through 0.75	0.57

6.3. **Curb.** Work performed and furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Curb" of the type specified.

Item 402

Trench Excavation Protection

1. DESCRIPTION

Furnish and place excavation protection for trenches 5 ft. or greater in depth.

2. CONSTRUCTION

Provide vertical or sloped cuts, benches, shields, support systems, or other systems providing the necessary protection in accordance with OSHA Standards and Interpretations, 29 CFR Part 1926, Subpart P, "Excavations."

3. MEASUREMENT

This Item will be measured by the foot along the long axis of the trench where the depth of trench exceeds 5 ft. This measurement includes all required trench protection, including trench ends.

4. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Trench Excavation Protection." This price is full compensation for excavation and backfill required for excavation protection; furnishing, placing, and removing shoring, sheeting, or bracing; de-watering or diversion of water; jacking and jack removal; and equipment, labor, materials, tools, and incidentals.

Item 432

Riprap

1. DESCRIPTION

Furnish and place concrete, stone, cement-stabilized, or special riprap.

2. MATERIALS

Furnish materials in accordance with the following Items.

- Item 420, "Concrete Substructures,"
- Item 421, "Hydraulic Cement Concrete,"
- Item 431, "Pneumatically Placed Concrete,"
- Item 440, "Reinforcement for Concrete," and
- [DMS-6200](#), "Filter Fabric."

2.1 **Concrete Riprap.** Use Class B Concrete unless otherwise shown on the plans.

2.2 **Pneumatically Placed Concrete Riprap.** Use Class II concrete that meets Item 431, "Pneumatically Placed Concrete," unless otherwise shown on the plans.

2.3 **Stone Riprap.** Use durable natural stone with a bulk specific gravity of at least 2.50 as determined by [Tex-403-A](#) unless otherwise shown on the plans. Provide stone that, when tested in accordance with [Tex-411-A](#), has weight loss of no more than 18% after 5 cycles of magnesium sulfate solution.

Perform a size verification test on the first 5,000 sq. yd. of finished riprap stone for all types of stone riprap at a location determined by the Engineer. Test the riprap stone in accordance with ASTM D5519. Additional tests may be required. Do not place additional riprap until the initial 5,000 sq. yd. of riprap has been approved.

Provide grout or mortar in accordance with Item 421, "Hydraulic Cement Concrete," when specified. Provide grout with a consistency that will flow into and fill all voids.

Provide filter fabric in accordance with [DMS-6200](#), "Filter Fabric." Provide Type 2 filter fabric for protection stone riprap unless otherwise shown on the plans. Provide Type 2 filter fabric for Type R, F, or Common stone riprap when shown on the plans.

2.3.1 **Type R.** Use stones between 50 and 250 lb. with at least 50% of the stones heavier than 100 lb.

2.3.2 **Type F.** Use stones between 50 and 250 lb. with at least 40% of the stones heavier than 100 lb. Use stones with at least 1 broad flat surface.

2.3.3 **Common.** Use stones between 50 and 250 lb. Use stones that are at least 3 in. in their least dimension. Use stones that are at least twice as wide as they are thick. When shown on the plans or approved, material may consist of broken concrete removed under the Contract or from other approved sources. Cut exposed reinforcement flush with all surfaces before placement of each piece of broken concrete.

2.3.4 **Protection.** Use boulders or quarried rock that meets the gradation requirements of Table 1. Both the width and the thickness of each piece of riprap must be at least 1/3 of the length. When shown on the plans or as approved, material may consist of broken concrete removed under the Contract or from other approved sources. Cut exposed reinforcement flush with all surfaces before placement of each

piece of broken concrete. Determine gradation of the finished, in-place, riprap stone under the direct supervision of the Engineer in accordance with ASTM D5519.

**Table 1
In-Place Protection Riprap Gradation Requirements**

Size	Maximum Size (lb.)	90% Size ¹ (lb.)	50% Size ² (lb.)	8% Size ³ Minimum (lb.)
12 in.	200	80–180	30–75	3
15 in.	320	170–300	60–165	20
18 in.	530	290–475	105–220	22
21 in.	800	460–720	175–300	25
24 in.	1,000	550–850	200–325	30
30 in.	2,600	1,150–2,250	400–900	40

1. Defined as that size such that 10% of the total riprap stone, by weight, is larger and 90% is smaller.
2. Defined as that size such that 50% of the total riprap stone, by weight, is larger and 50% is smaller.
3. Defined as that size such that 92% of the total riprap stone, by weight, is larger and 8% is smaller.

The Engineer may require in-place verification of the stone size. Determine the in-place size of the riprap stone by taking linear transects along the riprap and measuring the intermediate axis of the stone at select intervals. Place a tape measure along the riprap and determine the intermediate axis size of the stone at 2 ft. intervals. Measure a minimum of 100 stones, either in a single transect or in multiple transects, then follow ASTM D5519 Test Procedure Part B to determine the gradation. Table 2 is a guide for comparing the stone size in inches to the stone weight shown in Table 1.

**Table 2
Protection Riprap Stone Size¹**

Size	Dmax (in.)	D90 (in.)	D50 (in.)	D8 (in.)
12 in.	13.76	10.14–13.29	7.31–9.92	3.39
15 in.	16.10	13.04–15.75	9.21–12.91	6.39
18 in.	19.04	15.58–18.36	11.10–14.21	6.59
21 in.	21.85	18.17–21.09	13.16–15.75	6.88
24 in.	23.53	19.28–22.29	13.76–16.18	7.31
30 in.	32.36	24.65–30.84	17.34–22.72	8.05

1. Based on a Specific Gravity of 2.5 and using the following equation for the intermediate axis diameter $D = \{(12 \cdot W) / (G_s \cdot 62.4 \cdot 0.85)\}^{1/3}$

where:

D = intermediate axis diameter in in.;

W = weight of stone in lbs.;

G_s = Specific Gravity of stone.

Note—If the Specific Gravity of the stone is different than 2.5, then the above equation can be used to determine the appropriate size using the actual Specific Gravity.

If required, provide bedding stone that, in-place, meets the gradation requirements shown in Table 3 or as otherwise shown on the plans. Determine the size distribution in Table 3 in accordance with ASTM D6913.

**Table 3
Protection Riprap Bedding Material Gradation Requirements**

Sieve Size (Sq. Mesh)	% by Weight Passing
3"	100
1-1/2"	50–80
3/4"	20–60
#4	0–15
#10	0–5

2.4

Cement-Stabilized Riprap. Provide aggregate that meets Item 247, "Flexible Base," for the type and grade shown on the plans. Use cement-stabilized riprap with 7% hydraulic cement by dry weight of the aggregate.

2.5 **Special Riprap.** Furnish materials for special riprap according to the plans.

3 CONSTRUCTION

Dress slopes and protected areas to the line and grade shown on the plans before the placement of riprap. Place riprap and toe walls according to details and dimensions shown on the plans or as directed.

3.1 **Concrete Riprap.** Reinforce concrete riprap with 6 × 6 – W2.9 × W2.9 welded wire fabric or with No. 3 or No. 4 reinforcing bars spaced at a maximum of 18 in. in each direction unless otherwise shown. Alternative styles of welded wire fabric that provide at least 0.058 sq. in. of steel per foot in both directions may be used if approved. A combination of welded wire fabric and reinforcing bars may be provided when both are permitted. Provide a minimum 6-in. lap at all splices. Provide horizontal cover of at least 1 in. and no more than 3 in. at the edge of the riprap. Place the first parallel bar no more than 6 in. from the edge of concrete. Use approved supports to hold the reinforcement approximately equidistant from the top and bottom surface of the slab. Adjust reinforcement during concrete placement to maintain correct position.

Sprinkle or sprinkle and consolidate the subgrade before the concrete is placed as directed. All surfaces must be moist when concrete is placed.

Compact and shape the concrete once it has been placed to conform to the dimensions shown on the plans. Finish the surface with a wood float after it has set sufficiently to avoid slumping to secure a smooth surface or broom finish as approved.

Cure the riprap immediately after the finishing operation according to Item 420, "Concrete Substructures."

3.2 **Stone Riprap.** Provide the following types of stone riprap when shown on the plans:

- **Dry Riprap.** Stone riprap with voids filled with only spalls or small stones.
- **Grouted Riprap.** Type R, F, or Common stone riprap with voids grouted after all the stones are in place.
- **Mortared Riprap.** Type F stone riprap laid and mortared as each stone is placed.

Use spalls and small stones lighter than 25 lb. to fill open joints and voids in stone riprap, and place to a tight fit.

Place mortar or grout only when the air temperature is above 35°F. Protect work from rapid drying for at least 3 days after placement.

Place filter fabric with the length running up and down the slope unless otherwise approved. Ensure fabric has a minimum overlap of 2 ft. Secure fabric with nails or pins. Use nails at least 2 in. long with washers or U-shaped pins with legs at least 9 in. long. Space nails or pins at a maximum of 10 ft. in each direction and 5 ft. along the seams. Alternative anchorage and spacing may be used when approved.

3.2.1 **Type R.** Construct riprap as shown in Figure 1 on the *Stone Riprap Standard* and as shown on the plans. Place stones in a single layer with close joints so most of their weight is carried by the earth and not the adjacent stones. Place the upright axis of the stones at an angle of approximately 90° to the embankment slope. Place each course from the bottom of the embankment upward with the larger stones in the lower courses.

Fill open joints between stones with spalls. Place stones to create a uniform finished top surface. Do not exceed a 6-in. variation between the tops of adjacent stones. Replace, embed deeper, or chip away stones that project more than the allowable amount above the finished surface.

Prevent earth, sand, or foreign material from filling the spaces between the stones when the plans require Type R stone riprap to be grouted. Wet the stones thoroughly after they are in place, fill the spaces between the stones with grout, and pack. Sweep the surface of the riprap with a stiff broom after grouting.

3.2.2. **Type F.**

3.2.2.1. **Dry Placement.** Construct riprap as shown in Figure 2 on the *Stone Riprap Standard*. Set the flat surface on a prepared horizontal earth bed, and overlap the underlying course to secure a lapped surface. Place the large stones first, roughly arranged in close contact. Fill the spaces between the large stones with suitably sized stones placed to leave the surface evenly stepped and conforming to the contour required. Place stone to drain water down the face of the slope.

3.2.2.2. **Grouting.** Construct riprap as shown in Figure 3 on the *Stone Riprap Standard*. Size, shape, and lay large flat-surfaced stones to produce an even surface with minimal voids. Place stones with the flat surface facing upward parallel to the slope. Place the largest stones near the base of the slope. Fill spaces between the larger stones with stones of suitable size, leaving the surface smooth, tight, and conforming to the contour required. Place the stones to create a plane surface with a variation no more than 6 in. in 10 ft. from true plane. Provide the same degree of accuracy for warped and curved surfaces. Prevent earth, sand, or foreign material from filling the spaces between the stones. Wet the stones thoroughly after they are in place, fill the spaces between them with grout, and pack. Sweep the surface with a stiff broom after grouting.

3.2.2.3. **Mortaring.** Construct riprap as shown in Figure 2 on the *Stone Riprap Standard*. Lap courses as described for dry placement. Wet the stones thoroughly before placing mortar. Bed the larger stones in fresh mortar as they are being placed and shove adjacent stones into contact with one another. Spread excess mortar forced out during placement of the stones uniformly over them to fill all voids completely. Point up all joints roughly either with flush joints or shallow, smooth-raked joints as directed.

3.2.3. **Common.** Construct riprap as shown in Figure 4 on the *Stone Riprap Standard*. Place stones on a bed excavated for the base course. Bed the base course of stone well into the ground with the edges in contact. Bed and place each succeeding course in even contact with the preceding course. Use spalls and small stones to fill any open joints and voids in the riprap. Ensure the finished surface presents an even, tight surface, true to the line and grades of the typical sections.

Prevent earth, sand, or foreign material from filling the spaces between the stones when the plans require grouting common stone riprap. Wet the stones thoroughly after they are in place; fill the spaces between them with grout; and pack. Sweep the surface with a stiff broom after grouting.

3.2.4. **Protection.** Construct riprap as shown in Figure 5 on the *Stone Riprap Standard*. Place riprap stone on the slopes within the limits shown on the plans. Place stone for riprap on the filter fabric to produce a reasonably well-graded mass of riprap with the minimum practicable percentage of voids. Construct the riprap to the lines and grades shown on the plans or staked in the field. A tolerance of +6 in. and -0 in. from the slope line and grades shown on the plans is allowed in the finished surface of the riprap. Place riprap to its full thickness in a single operation. Avoid displacing the filter fabric. Ensure the entire mass of stones in their final position is free from objectionable pockets of small stones and clusters of larger stones. Do not place riprap in layers, and do not place it by dumping it into chutes, dumping it from the top of the slope, pushing it from the top of the slope, or any method likely to cause segregation of the various sizes. Obtain the desired distribution of the various sizes of stones throughout the mass by selective loading of material at the quarry or other source or by other methods of placement that will produce the specified results. Rearrange individual stones by mechanical equipment or by hand if necessary to obtain a reasonably well-graded distribution of stone sizes. Use the bedding thickness shown and place stone for riprap on the bedding material to produce a reasonably well-graded mass of riprap with the minimum practicable percentage of voids if required on the plans.

- 3.3. **Pneumatically Placed Concrete Riprap, Class II.** Meet Item 431, "Pneumatically Placed Concrete." Provide reinforcement following the details on the plans and Item 440, "Reinforcement for Concrete." Support reinforcement with approved supports throughout placement of concrete.

Give the surface a wood-float finish or a gun finish as directed. Cure the riprap with membrane-curing compound immediately after the finishing operation in accordance with Item 420, "Concrete Substructures."

- 3.4. **Cement-Stabilized Riprap.** Follow the requirements of the plans and the provisions for concrete riprap except when reinforcement is not required. The Engineer will approve the design and mixing of the cement- stabilized riprap.

- 3.5. **Special Riprap.** Construct special riprap according to the plans.

4. MEASUREMENT

This Item will be measured by the cubic yard of material complete in place. Volume will be computed on the basis of the measured area in place and the thickness and toe wall width shown on the plans.

If required on the plans, the pay quantity of the bedding material for stone riprap for protection to be paid for will be measured by the cubic yard as computed from the measured area in place and the bedding thickness shown on the plans.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Riprap" of the type, thickness, and void-filling technique (Dry, Grout, Mortar) specified, as applicable. This price is full compensation for furnishing, hauling, and placing riprap and for filter fabric, expansion joint material, concrete and reinforcing steel, grout and mortar, scales, test weights, equipment, labor, tools, and incidentals.

Payment for excavation of toe wall trenches, for all necessary excavation below natural ground or bottom of excavated channel, and for shaping of slopes for riprap will be included in the unit price bid per cubic yard of riprap.

When bedding is required for protection stone riprap, payment will be made at the unit price for "Bedding Material" of the thickness specified. This price is full compensation for furnishing, hauling, placing, and maintaining the bedding material until placement of the riprap cover is completed and accepted; excavation required for placement of bedding material; and equipment, scales, test weights, labor, tools, and incidentals. No payment will be made for excess thickness of bedding nor for material required to replace embankment material lost by rain wash, wind erosion, or otherwise.

Item 462

Concrete Box Culverts and Drains

1. DESCRIPTION

Furnish, construct, and install concrete box culverts and drains.

2. MATERIALS

2.1. **General.** Furnish materials in accordance with the following.

- Item 420, "Concrete Substructures,"
- Item 421, "Hydraulic Cement Concrete,"
- Item 440, "Reinforcement for Concrete," and
- Item 464, "Reinforced Concrete Pipe."

Provide cast-in-place or precast, formed or machine-made, box culverts, and drains. Use Class S concrete for top slabs of cast-in-place concrete culverts for culverts with overlay, a 1- to 2-course surface treatment or a top slab that is the final riding surface unless otherwise shown on the plans. Use Class C concrete for the rest of the culvert and for all other cast-in-place boxes. Culverts with fill do not require Class S concrete.

Furnish material for machine-made precast boxes in accordance with [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification."

2.2. **Fabrication.**

2.2.1. **Cast-in-Place.** Meet Item 420, "Concrete Substructures" and Item 422, "Concrete Superstructures."

2.2.2. **Formed Precast.** Meet Item 424, "Precast Concrete Structural Members (Fabrication)."

2.2.3. **Machine-Made Precast.** Machine-made precast box culvert fabrication plants must be approved in accordance with [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification." The Department's MPL shows approved machine-made precast box culvert plants. Fabricate machine-made precast boxes in accordance with [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification."

2.3. **Testing.**

2.3.1. **Cast-in-Place.** Provide test specimens that meet Item 421, "Hydraulic Cement Concrete."

2.3.2. **Formed Precast.** Make, cure, and test compressive test specimens in accordance with [Tex-704-I](#).

2.3.3. **Machine-Made Precast.** Make, cure, and test compressive test specimens in accordance with [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification."

2.3.4. **Testing Equipment.** The producer must furnish all equipment required for testing concrete for boxes produced in a precasting plant.

2.4. **Lifting Holes.** Provide no more than 4 lifting holes in each section for precast boxes. Lifting holes may be cast, cut into fresh concrete after form removal, or drilled. Provide lifting holes large enough for adequate lifting devices based on the size and weight of the box section. Use lifting holes no larger than 3 in. in diameter. Cut no more than 5 in. in any direction of reinforcement per layer for lifting holes.

2.5. **Marking.** Mark precast boxes with the following:

- name or trademark of fabricator and plant location;
- ASTM designation;
- date of manufacture;
- box size;
- minimum and maximum fill heights;
- designated fabricator's approval stamp;
- boxes to be used for jacking and boring (when applicable);
- designation "SR" for boxes meeting sulfate-resistant concrete plan requirements (when applicable); and
- match-marks for proper installation, when required under Section 462.2.6., "Tolerances."

Mark 1 end of each box section, for boxes without lifting holes, on the inside and outside walls to indicate the top or bottom as it will be installed.

Indent markings into the box section or paint them on each box with waterproof paint.

2.6. **Tolerances.** Ensure precast sections meet the permissible variations listed in ASTM C1577 and that the sides of a section at each end do not vary from being perpendicular to the top and bottom by more than 1/2 in. when measured diagonally between opposite interior corners.

Ensure wall and slab thicknesses are not less than shown on the plans except for occasional deficiencies not greater than 3/16 in. or 5%, whichever is greater. If proper jointing is not affected, thicknesses in excess of plan requirements are acceptable.

Deviations from the above tolerances will be acceptable if the sections can be fitted at the plant or jobsite and the joint opening at any point does not exceed 1 in. Use match-marks for proper installation on sections that have been accepted in this manner.

2.6.1. **Boxes for Jacking Operations.** Use boxes for jacking operations as defined in Item 476, "Jacking, Boring, or Tunneling Pipe or Box," meeting the following additional requirements:

- The box ends must be square such that no point deviates more than 3/8 in. from a plane placed on the end of the box that is perpendicular to the box sides, and
- The slab and wall thicknesses must not be less than specified on the plans and must not exceed the specified thickness by more than 1/2 in.

2.7. **Defects and Repair.** Fine cracks on the surface of the member that do not extend to the plane of the nearest reinforcement are acceptable unless the cracks are numerous and extensive. Repair cracks that extend into the plane of the reinforcing steel in an approved manner. Excessive damage, honeycomb, or cracking will be subject to structural review. The Engineer may accept boxes with repairs that are sound, properly finished, and cured in conformance with pertinent specifications. Discontinue further production of precast sections when fine cracks on the surface indicate poor curing practices until corrections are made and proper curing is provided.

Repair machine-made precast boxes in accordance with [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification."

2.8. **Storage and Shipment.** Store precast sections on a level surface. Do not place any load on the sections until design strength is reached and curing is complete. Shipment of sections is permissible when the design strength and curing requirements have been met.

3. CONSTRUCTION

- 3.1. **Excavation, Shaping, Bedding, and Backfill.** Excavate, shape, bed, and backfill in accordance with Item 400, "Excavation and Backfill for Structures," except where jacking, boring, or tunneling methods are shown on the plans or permitted. Jack, bore, or tunnel in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." Immediate backfilling is permitted for all box structures where joints consist of materials other than mortar. Take precautions in placing and compacting the backfill to avoid any movement of the boxes or damage to the joints. Remove and replace boxes damaged by the Contractor at no expense to the Department.
- 3.2. **Placement of Boxes.** Place the box sections in conformance with the plans or as directed when precast boxes are used to form multiple barrel structures. Place material to be used between barrels as shown on the plans or as directed. Start the laying of boxes on the bedding at the outlet end and proceed toward the inlet end with the abutting sections properly matched unless otherwise authorized. Fit, match, and lay the boxes to form a smooth, uniform conduit true to the established lines and grades. Lower the box sections into the trench, for trench installations, without damaging the box or disturbing the bedding and the sides of the trench. Carefully clean the ends of the box before it is placed. Prevent the earth or bedding material from entering the box as it is laid. Remove and re-lay, without extra compensation, boxes that are not in alignment or show excessive settlement after laying. Form and place cast-in-place boxes in accordance with Item 420, "Concrete Substructures."
- 3.3. **Jointing.** Use any of the jointing materials in accordance with the joint requirements specified in Item 464, "Reinforced Concrete Pipe," unless otherwise shown on the plans. Box joints for rubber gasketed material may be substituted for tongue and groove joints, provided they meet the requirements of ASTM C1677 for design of the joints and permissible variations in dimensions.
- 3.4. **Connections and Stub Ends.** Make connections of boxes to existing boxes, pipes, drains, or drain appurtenances as shown on the plans. Mortar or concrete the bottom of existing structures if necessary to eliminate any drainage pockets created by the connections. Connect boxes to any required headwalls, wingwalls, safety end treatments or riprap, or other structures as shown on the plans or as directed. Repair any damage to the existing structure resulting from making the connections. Finish stub ends for connections to future work not shown on the plans by installing watertight plugs into the free end of the box.
- Fill lifting holes with mortar or concrete and cure for precast boxes. Precast concrete or mortar plugs may be used.
- 3.5. **Extending.** Break back and extend existing culverts in accordance with Section 420.4.8 "Extending Existing Substructures," and Section 422.4.5 "Extending Existing Slabs," as applicable.

4. MEASUREMENT

This Item will be measured by the foot. Measurement will be made between the ends of the culvert or drain along the flow line, not including safety end treatments. Safety end treatments will be measured in accordance with Item 467, "Safety End Treatment." Measurement of spurs, branches, or new connection box section will be made from the intersection of the flow line with the outside surface of the structure into which it connects. Where inlets, headwalls, wingwalls, catch basins, manholes, junction chambers, or other structures are included in lines of culverts or drains, the length of box section tying into the structure wall will be included for measurement, but no other portion of the structure length or width will be included.

The measured length of multiple barrel structures will be the sum of the lengths of the barrels.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Box Culvert" of the size specified. This price is full compensation for constructing, furnishing, and transporting sections; preparation and shaping of the bed; backfill material between box sections; jointing of sections; jointing material; cutting of sections on skew or slope; connections to new or existing structures; breaking back, removing and disposing of portions of the existing structure and replacing portions of the existing structure as required to make connections; concrete and reinforcing steel; and equipment, labor, materials, tools, and incidentals.

Protection methods for excavations greater than 5 ft. deep will be measured and paid for as required under Item 402, "Trench Excavation Protection," or Item 403, "Temporary Special Shoring." Excavation, shaping, bedding, and backfill will be paid for in accordance with Item 400, "Excavation and Backfill for Structures." When jacking, boring, or tunneling is used at the Contractor's option, payment will be made under this Item. When jacking, boring, or tunneling is required, payment will be made under Item 476, "Jacking, Boring, or Tunneling Pipe or Box."

Item 464

Reinforced Concrete Pipe

1. DESCRIPTION

Furnish and install reinforced concrete pipe, materials for precast concrete pipe culverts, or precast concrete storm drain mains, laterals, stubs, and inlet leads.

2. MATERIALS

2.1 **Fabrication.** Fabrication plants must be approved by the Construction Division in accordance with [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification," before furnishing precast reinforced concrete pipe for Department projects. The Department's MPL has a list of approved reinforced concrete pipe plants.

Furnish material and fabricate reinforced concrete pipe in accordance with [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification."

2.2 **Design.**

2.2.1 **General.** The class and D-load equivalents are shown in Table 1. Furnish arch pipe in accordance with ASTM C506 and the dimensions shown in Table 2. Furnish horizontal elliptical pipe in accordance with ASTM C507 and the dimensions shown in Table 3. For arch pipe and horizontal elliptical pipe the minimum height of cover required is 1 ft.

Table 1
Circular Pipe
ASTM C76 & ASTM C655

Class	D-Load
I	800
II	1,000
III	1,350
IV	2,000
V	3,000

Table 2
Arch Pipe

Design Size	Equivalent Diameter (in.)	Rise (in.)	Span (in.)
1	18	13-1/2	22
2	21	15-1/2	26
3	24	18	28-1/2
4	30	22-1/2	36-1/4
5	36	26-5/8	43-3/4
6	42	31-5/16	51-1/8
7	48	36	58-1/2
8	54	40	65
9	60	45	73
10	72	54	88

**Table 3
Horizontal Elliptical Pipe**

Design Size	Equivalent Diameter (in.)	Rise (in.)	Span (in.)
1	18	14	23
2	24	19	30
3	27	22	34
4	30	24	38
5	33	27	42
6	36	29	45
7	39	32	49
8	42	34	53
9	48	38	60
10	54	43	68

2.2.2. **Jacking, Boring, or Tunneling.** Design pipe for jacking, boring, or tunneling considering the specific installation conditions such as the soil conditions, installation methods, anticipated deflection angles, and jacking stresses. Provide design notes and drawings signed and sealed by a Texas licensed professional engineer when requested.

2.3 **Marking.** Furnish each section of reinforced concrete pipe marked with the following information specified in [DMS-7310](#), “Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification.”

- class or D-load of pipe,
- ASTM designation,
- date of manufacture,
- pipe size,
- name or trademark of fabricator and plant location,
- designated fabricator’s approval stamp,
- pipe to be used for jacking and boring (when applicable), and
- designation “SR” for pipe meeting sulfate-resistant concrete plan requirements (when applicable).

Clearly mark 1 end of each section during the process of manufacture or immediately thereafter for pipe with elliptical reinforcement. Mark the pipe on the inside and outside of opposite walls to show the location of the top or bottom of the pipe as it should be installed unless the external shape of the pipe is such that the correct position of the top and bottom is obvious. Mark the pipe section by indenting or painting with waterproof paint.

2.4 **Inspection.** Provide access for inspection of the finished pipe at the project site before and during installation.

2.5 **Causes for Rejection.** Individual section of pipe may be rejected for any of the conditions stated in the Annex of [DMS-7310](#), “Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification.”

2.6 **Repairs.** Make repairs if necessary as stated in the Annex of [DMS-7310](#), “Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification.”

2.7 **Jointing Materials.** Use any of the following materials for the making of joints unless otherwise shown on the plans. Furnish a manufacturer’s certificate of compliance for all jointing materials except mortar.

2.7.1 **Mortar.** Provide mortar for joints that meets the requirements of Section 464.3.3., “Jointing.”

2.7.2 **Cold-Applied, Plastic Asphalt Sewer Joint Compound.** Provide a material that consists of natural or processed asphalt base, suitable volatile solvents, and inert filler. Ensure the consistency is such that the ends of the pipe can be coated with a layer of the compound up to 1/2 in. thick by means of a trowel.

Provide a joint compound that cures to a firm, stiff plastic condition after application. Provide a material of a uniform mixture. Stir any small separation found in the container into a uniform mix before using.

Provide a material that meets the requirements of Table 4 when tested in accordance with [Tex-526-C](#).

Table 4
Cold-Applied, Plastic Asphalt Sewer Joint Compound Material Requirements

Composition	Analysis
Asphalt base, 100%-% volatiles-% ash, % by weight	28-45
Volatiles, 212°F evaporation, 24 hr., % by weight	10-26
Mineral matter, determined as ash, % by weight	30-55
Consistency, cone penetration, 150 q, 5 sec., 77°F	150-275

- 2.7.3 **Rubber Gaskets.** Provide gaskets that conform to ASTM C1619 Class A or C. Meet the requirements of ASTM C443 for design of the pipe joints and permissible variations in dimensions.
- 2.7.4 **Pre-Formed Flexible Joint Sealants.** Pre-formed flexible joint sealants may be used for sealing joints of tongue-and-groove concrete pipe. Provide flexible joint sealants that meet the requirements of ASTM C990. Use flexible joint sealants that do not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength. Supply in extruded rope form of suitable cross-section. Provide a size of the pre-formed flexible joint sealant in accordance with the manufacturer's recommendations and large enough to properly seal the joint. Protect flexible joint sealants with a suitable wrapper able to maintain the integrity of the jointing material when the wrapper is removed.

3. CONSTRUCTION

- 3.1. **Excavation, Shaping, Bedding, and Backfill.** Excavate, shape, bed, and backfill in accordance with Item 400, "Excavation and Backfill for Structures," except where jacking, boring, or tunneling methods are permitted. Jack, bore, or tunnel the pipe in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." Immediate backfilling is permitted if joints consist of materials other than mortar. Take special precautions in placing and compacting the backfill to avoid any movement of the pipe or damage to the joints. Do not use heavy earth-moving equipment to haul over the structure until a minimum of 4 ft. of permanent or temporary compacted fill has been placed over the structure unless otherwise shown on the plans or permitted in writing. Remove and replace pipe damaged by the Contractor at no expense to the Department.
- 3.2. **Laying Pipe.** Start the laying of pipe on the bedding at the outlet end with the spigot or tongue end pointing downstream, and proceed toward the inlet end with the abutting sections properly matched, true to the established lines and grades unless otherwise authorized. Fit, match, and lay the pipe to form a smooth, uniform conduit. Cut cross trenches in the foundation to allow the barrel of the pipe to rest firmly upon the bedding where bell-and-spigot pipe is used. Cut cross trenches no more than 2 in. larger than the bell ends of the pipe. Lower sections of pipe into the trench without damaging the pipe or disturbing the bedding and the sides of the trench. Carefully clean the ends of the pipe before the pipe is placed. Prevent the earth or bedding material from entering the pipe as it is laid. Lay the pipe in the trench, when elliptical pipe with circular reinforcing or circular pipe with elliptical reinforcing is used, so the markings for the top or bottom are not more than 5° from the vertical plane through the longitudinal axis of the pipe. Remove and re-lay, without extra compensation, pipe that is not in alignment or shows excessive settlement after laying.

Lay multiple lines of reinforced concrete pipe with the centerlines of the individual barrels parallel. Use the clear distances between outer surfaces of adjacent pipes shown in Table 5 unless otherwise shown on the plans. Use the equivalent diameter from Table 2 or Table 3 for arch pipe or horizontal elliptical pipe to determine the clear distance requirement in Table 5.

Table 5
Minimum Clear Distance between Pipes

Equivalent Diameter	Min Clear Distance
18 in.	9 in.
24 in.	11 in.
30 in.	1 ft. 1 in.
36 in.	1 ft. 3 in.
42 in.	1 ft. 5 in.
48 in.	1 ft. 7 in.
54 in.	1 ft. 11 in.
60 to 84 in.	1 ft.

- 3.3. **Jointing.** Make available an appropriate rolling device similar to an automobile mechanic's "creeper" for conveyance through small-size pipe structures.
- 3.3.1. **Joints Sealed with Hydraulic Cement Mortar.** Use Type S mortar meeting the requirements of ASTM C270. Clean and wet the pipe ends before making the joint. Plaster the lower half of the bell or groove and the upper half of the tongue or spigot with mortar. Pack mortar into the joint from both inside and outside the pipe after the pipes are tightly jointed. Finish the inside smooth and flush with adjacent joints of pipe. Form a bead of semicircular cross-section over tongue-and-groove joints outside the pipe, extending at least 1 in. on each side of the joint. Form the mortar for bell-and-spigot joints to a 45° fillet between the outer edge of the bell and the spigot. Cure mortar joints by keeping the joints wet for at least 48 hr. or until the backfill has been completed, whichever comes first. Place fill or backfill once the mortar jointing material has cured for at least 6 hr. Conduct jointing only when the atmospheric temperature is above 40°F. Protect mortared joints against freezing by backfilling or other approved methods for at least 24 hr.
- Driveway culverts do not require mortar banding on the outside of the pipe.
- Furnish pipes, with approval, that are large enough for a person to enter with the groove between 1/2 in. and 3/4 in. longer than the tongue. Such pipe may be laid and backfilled without mortar joints. Clean the space on the interior of the pipe between the end of the tongue and the groove of all foreign material, thoroughly wet and fill with mortar around the entire circumference of the pipe, and finish flush after the backfilling has been completed.
- 3.3.2. **Joints Using Cold-Applied, Plastic Asphalt Sewer Joint Compound.** Ensure both ends of the pipes are clean and dry. Trowel or otherwise place a 1/2-in. thick layer of the compound in the groove end of the pipe covering at least 2/3 of the joint face around the entire circumference. Shove home the tongue end of the next pipe with enough pressure to make a tight joint. Remove any excess mastic projecting into the pipe after the joint is made. Backfill after the joint has been inspected and approved.
- 3.3.3. **Joints Using Rubber Gaskets.** Make the joint assembly according to the recommendations of the gasket manufacturer. Make joints watertight when using rubber gaskets. Backfill after the joint has been inspected and approved.
- 3.3.4. **Joints Using Pre-Formed Flexible Joint Sealants.** Install pre-formed flexible joint sealants in accordance with the manufacturer's recommendations. Place the joint sealer so no dirt or other deleterious materials come in contact with the joint sealing material. Pull or push home the pipe with enough force to properly seal the joint. Remove any joint material pushed out into the interior of the pipe that would tend to obstruct the flow. Store pre-formed flexible joint sealants in an area warmed naturally or artificially to above 70°F in an approved manner when the atmospheric temperature is below 60°F. Apply flexible joint sealants to pipe joints immediately before placing pipe in trench, and connect pipe to previously laid pipe. Backfill after the joint has been inspected and approved.
- 3.4. **Connections and Stub Ends.** Make connections of concrete pipe to existing pipes, pipe storm drains, or storm drain appurtenances as shown on the plans.

Mortar or concrete the bottom of existing structures if necessary to eliminate any drainage pockets created by the connections. Repair any damage to the existing structure resulting from making the connections.

Make connections between concrete pipe and corrugated metal pipe with a suitable concrete collar and a minimum thickness of 4 in. unless otherwise shown on the plans.

Finish stub ends for connections to future work not shown on the plans by installing watertight plugs into the free end of the pipe.

Fill lift holes with concrete, mortar, or precast concrete plugs after the pipe is in place.

4. MEASUREMENT

This Item will be measured by the foot. Measurement will be made between the ends of the pipe barrel along the flow line, not including safety end treatments. Safety end treatments will be measured in accordance with Item 467, "Safety End Treatment." Pipe that will be jacked, bored, or tunneled will be measured in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box." Measurement of spurs, branches, or new connecting pipe will be made from the intersection of the flow line with the outside surface of the pipe into which it connects. Where inlets, headwalls, catch basins, manholes, junction chambers, or other structures are included in lines of pipe, the length of pipe tying into the structure wall will be included for measurement, but no other portion of the structure length or width will be included.

For multiple pipes, the measured length will be the sum of the lengths of the barrels.

This is a plans quantity measurement Item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Reinforced Concrete Pipe," "Reinforced Concrete Pipe (Arch)," or "Reinforced Concrete Pipe (Elliptical)" of the size and D-load specified or of the size and class specified. This price is full compensation for constructing, furnishing, transporting, placing, and joining pipes; shaping the bed; cutting pipes on skew or slope; connecting to new or existing structures; breaking back, removing, and disposing of portions of the existing structure; replacing portions of the existing structure; cutting pipe ends on skew or slope; and equipment, labor, tools, and incidentals.

Protection methods for excavations greater than 5 ft. deep will be measured and paid for as required under Item 402, "Trench Excavation Protection," or Item 403, "Temporary Special Shoring." Excavation, shaping, bedding, and backfill will be paid for in accordance with Item 400, "Excavation and Backfill for Structures." When jacking, boring, or tunneling is used at the Contractor's option, payment will be made under this Item. When jacking, boring or tunneling is required, payment will be made under Item 476, "Jacking, Boring or Tunneling Pipe or Box."

Item 465

Junction Boxes, Manholes, and Inlets

1. DESCRIPTION

Construct junction boxes, manholes, and inlets, complete in place or to the stage detailed, including furnishing and installing frames, grates, rings, and covers.

2. MATERIALS

Furnish materials in accordance with the following:

- Item 420, "Concrete Substructures,"
- Item 421, "Hydraulic Cement Concrete,"
- Item 440, "Reinforcement for Concrete," and
- Item 471, "Frames, Grates, Rings, and Covers."

Cast-in-place junction boxes, manholes, inlets, risers, and appurtenances are acceptable unless otherwise shown. Alternate designs for cast-in-place items must be acceptable to the Engineer and must conform to functional dimensions and design loading. Alternate designs must be designed and sealed by a licensed professional engineer.

- 2.1. **Concrete.** Furnish Class H concrete as referenced in Item 421 "Hydraulic Cement Concrete," except that Mix Design Options 1–8 will be allowed for formed precast junction boxes, manholes, and inlets. Furnish concrete per [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification," for machine-made precast junction boxes, manholes, and inlets. Furnish Class C concrete for cast-in-place manholes and inlets unless otherwise shown on the plans.
- 2.2. **Mortar.** Furnish mortar conforming to [DMS-4675](#), "Cementitious Grouts and Mortars for Miscellaneous Applications."
- 2.3. **Timber.** Provide sound timber that is a minimum of 3 in. nominal thickness and reasonably free of knots and warps for temporary covers when used with Stage I construction (see Article 465.3., "Construction").
- 2.4. **Other Materials.** Use commercial-type hardware as approved.

3. CONSTRUCTION

Construct all types of junction boxes, manholes, and inlets either complete or in 2 stages, described as Stage I and Stage II.

Construct the Stage I portion of junction boxes, manholes, and inlets as shown on the plans or as specified in this Item. Furnish and install a temporary cover as approved.

Furnish and install the storm drain pipe and a temporary plug for the exposed end of the storm drain pipe from the storm drain to a point below the top of curb indicated on the plans for Stage I construction of cast iron or steel inlet units.

Construct Stage II after the pavement structure is substantially complete unless otherwise approved.

Construct the remaining wall height and top of junction box, manhole, or inlet for Stage II, and furnish and install any frames, grates, rings and covers, curb beams, or collecting basins required.

Construct cast-in-place junction boxes, manholes, and inlets in accordance with Item 420, "Concrete Substructures." Forms will be required for all concrete walls. Outside wall forms for cast-in-place concrete may be omitted with approval if the surrounding material can be trimmed to a smooth vertical face.

- 3.1. **Precast Junction Boxes, Manholes, and Inlets.** Construct formed precast junction boxes, manholes, and inlets in accordance with Item 420, "Concrete Substructures," except as otherwise noted in this Item. Construct machine-made precast junction boxes, manholes, and inlets in accordance with ASTM C478 except as otherwise noted in this Item. Mix and place concrete for machine-made junction boxes, manholes, and inlets per the requirements of [DMS-7310](#), "Reinforced Concrete Pipe and Machine-Made Precast Concrete Box Culvert Fabrication and Plant Qualification." Conform to the product permissible variations and rejection criteria stated in ASTM C478 for machine-made precast junction boxes, manholes, and inlets. Cure all precast units in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)."
- Multi-project fabrication plants as defined in Item 424 "Precast Concrete Structural Members (Fabrication)," that produce manholes and inlets will be approved by the Construction Division in accordance with [DMS-7340](#), "Qualification Procedure for Multi-Project Fabrication Plants of Precast Concrete Junction Boxes, Manholes and Inlets." The Department's MPL has a list of approved multi-project plants.
- 3.1.1. **Lifting Holes.** Provide no more than 4 lifting holes in each section for precast units. Lifting holes may be cast, cut into fresh concrete after form removal, or drilled. Provide lifting holes large enough for adequate lifting devices based on the size and weight of the section. The maximum hole diameter is 3 in. at the inside surface of the wall and 4 in. at the outside surface. Cut no more than 5 in. in any direction of reinforcement per layer for lifting holes. Repair spalled areas around lifting holes.
- 3.1.2. **Marking.** Clearly mark each precast junction box, manhole, and inlet unit with the following information:
- name or trademark of fabricator and plant location;
 - product designation;
 - ASTM designation (if applicable);
 - date of manufacture;
 - designated fabricator's approval stamp; and
 - designation "SR" for product meeting sulfate-resistant concrete plan requirements (when applicable).
- 3.1.3. **Storage and Shipment.** Store precast units on a level surface. Do not ship units until design strength requirements have been met.
- 3.2. **Excavation, Shaping, Bedding, and Backfill.** Excavate, shape, bed, and backfill in accordance with Item 400, "Excavation and Backfill for Structures." Immediate backfilling is permitted for all junction box, manhole, and inlet structures where joints consist of rubber boots, rubber gaskets, or bulk or preformed joint sealant. Take precautions in placing and compacting the backfill to avoid any movement of junction boxes, manholes, and inlets. Remove and replace junction boxes, manholes, and inlets damaged by the Contractor at no expense to the Department.
- 3.3. **Junction Boxes, Manholes, and Inlets for Precast Concrete Pipe Storm Drains.** Construct junction boxes, manholes, and inlets for precast concrete pipe storm drains before completion of storm drain lines into or through the junction box, manhole, or inlet. Neatly cut all storm drains at the inside face of the walls of the junction box, manhole, or inlet.
- 3.4. **Junction Boxes, Manholes, and Inlets for Box Storm Drains.** Place bases or risers of junction boxes, manholes, and inlets for box storm drains before or in conjunction with placement of the storm drain. Backfill the junction box, manhole, or inlet and storm drain as a whole.

- 3.5. **Inverts.** Shape and route floor inverts passing out or through the junction box, manhole, or inlet as shown on the plans. Shape by adding and shaping mortar or concrete after the base is placed or by placing the required additional material with the base.
- 3.6. **Finishing Complete Junction Boxes, Manholes, and Inlets.** Complete junction boxes, manholes, and inlets in accordance with the plans. Backfill to original ground elevation in accordance with Item 400, "Excavation and Backfill for Structures."
- 3.7. **Finishing Stage I Construction.** Complete Stage I construction by constructing the walls to the elevations shown on the plans and backfilling to required elevations in accordance with Item 400, "Excavation and Backfill for Structures."
- 3.8. **Stage II Construction.** Construct subgrade and base course or concrete pavement construction over Stage I junction box, manhole, or inlet construction unless otherwise approved. Excavate to expose the top of Stage I construction and complete the junction box, manhole or inlet in accordance with the plans and these Specifications, including backfill and cleaning of all debris from the bottom of the junction box, manhole, or inlet.
- 3.9. **Inlet Units.** Install cast iron or steel inlet units in conjunction with the construction of concrete curb and gutter. Set the inlet units securely in position before placing concrete for curb and gutter. Form openings for the inlets and recesses in curb and gutter as shown on the plans. Place and thoroughly consolidate concrete for curb and gutter adjacent to inlets and around the inlet castings and formed openings and recesses without displacing the inlet units.

4. MEASUREMENT

All junction boxes, manholes, and inlets satisfactorily completed in accordance with the plans and specifications will be measured by each junction box, manhole, or inlet, complete, or by each junction box, manhole, or inlet completed to the stage of construction required by the plans.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for as follows:

- 5.1. **Complete Manholes.** Payment for complete manholes will be made at the unit price bid for "Manhole (Complete)" of the type specified.
- 5.2. **Complete Inlets.** Payment for inlets will be made at the unit price bid for "Inlet (Complete)," of the type specified.
- 5.3. **Complete Junction Boxes.** Payment for junction boxes will be made at the unit price bid for "Junction Box (Complete)" of the type specified.
- 5.4. **Manholes Stage I.** Payment for Manholes, Stage I, will be made at the unit price bid for each "Manhole (Stage I)" of the type specified.
- 5.5. **Manholes Stage II.** Payment for Manholes, Stage II, will be made at the unit price bid for each "Manhole (Stage II)" of the type specified.
- 5.6. **Inlets Stage I.** Payment for Inlets, Stage I, will be made at the unit price bid for each "Inlet (Stage I)" of the type specified.
- 5.7. **Inlets Stage II.** Payment for Inlets, Stage II, will be made at the unit price bid for each "Inlet (Stage II)" of the type specified.

5.8. **Junction Boxes Stage I.** Payment for Junction Boxes, Stage I, will be made at the unit price bid for each "Junction Box (Stage I)" of the type specified.

5.9. **Junction Boxes Stage II.** Payment for Junction Boxes, Stage II, will be made at the unit price bid for each "Junction Box (Stage II)" of the type specified.

This price is full compensation for concrete, reinforcing steel, mortar, frames, grates, rings and covers, excavation, and backfill and for all other materials, tools, equipment, labor, and incidentals

Item 466

Headwalls and Wingwalls

1. DESCRIPTION

Furnish, construct, and install concrete headwalls and wingwalls for drainage structures and underpasses.

2. MATERIALS

2.1. **General.** Furnish materials in accordance with the following.

- Item 420, "Concrete Substructures,"
- Item 421, "Hydraulic Cement Concrete," and
- Item 440, "Reinforcement for Concrete."

Use Class C concrete for cast-in-place and precast concrete units unless otherwise shown on the plans. Furnish cast-in-place or precast headwalls and wingwalls unless otherwise shown on the plans.

2.2. **Fabrication.**

2.2.1. **General.** Fabricate cast-in-place concrete units and precast units in accordance with Item 420 "Concrete Substructures." Use the following definitions for headwalls and wingwalls:

- "Headwalls" refers to all walls, including wings, at the ends of single-barrel and multiple-barrel pipe culvert structures.
- "Wingwalls" refers to all walls at the ends of single-barrel or multiple-barrel box culvert structures.

2.2.2. **Lifting Holes.** Provide no more than 4 lifting holes in each section for precast units. Lifting holes may be cast, cut into fresh concrete after form removal, or drilled. Provide lifting holes large enough for adequate lifting devices based on the size and weight of the section. The maximum hole diameter is 3 in. at the inside surface of the wall and 4 in. at the outside surface. Cut no more than 1 longitudinal wire or 2 circumferential wires per layer of reinforcing steel when locating lift holes. Repair spalled areas around lifting holes.

2.2.3. **Marking.** Clearly mark each precast unit before shipment from the casting or fabrication yard with the following:

- the date of manufacture,
- the name or trademark of the manufacturer, and
- the type and size designation.

2.2.4. **Storage and Shipment.** Store precast units on a level surface. Do not place any loads on precast concrete units until design strength is reached. Do not ship units until design strength requirements have been met.

2.2.5. **Causes for Rejection.** Precast units may be rejected for not meeting any one of the specification requirements. Individual units may also be rejected for fractures or cracks passing through the wall or surface defects indicating honeycombed or open texture surfaces. Remove rejected units from the project, and replace them with acceptable units meeting the requirements of this Item.

2.2.6. **Defects and Repairs.** Occasional imperfections in manufacture or accidental damage sustained during handling may be repaired. The repaired units will be acceptable if they conform to the

requirements of this Item and the repairs are sound, properly finished, and cured in conformance with pertinent specifications.

3. CONSTRUCTION

- 3.1. **General.** Remove portions of existing structures and drill, dowel, and grout in accordance with Item 420, "Concrete Substructures."
- 3.2. **Excavation, Shaping, Bedding, and Backfill.** Excavate, shape, bed, and backfill in accordance with Item 400, "Excavation and Backfill for Structures." Take special precautions in placing and compacting the backfill to avoid any movement or damage to the units. Bed precast units on foundations of firm and stable material accurately shaped to conform to the bases of the units.
- 3.3. **Placement of Precast Units.** Provide adequate means to lift and place the precast units. Fill lifting holes with mortar or concrete and cure. Precast concrete or mortar plugs may be used.
- 3.4. **Connections.** Make connections to new or existing structures in accordance with the details shown on the plans. Furnish jointing material in accordance with Item 464, "Reinforced Concrete Pipe," or as shown on the plans.

Remove a length of the existing pipe from the headwall to the joint when removing existing headwalls as shown on the plans or as approved. Re-lay the removed pipe if approved, or furnish and lay a length of new pipe.

4. MEASUREMENT

This is a plans quantity measurement item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

- 4.1. **Headwalls.** Headwalls will be measured by each end of a structure.
- 4.2. **Wingwalls.** Wingwalls will be measured by one of the following methods:
- 4.2.1. **Square Foot.** Wingwalls will be measured by the square foot of the front surface area of the wall of each type. The area will be measured from the top of the footing or apron to the top of the wall unless otherwise shown on the plans. If there is no footing or apron, then measurement is from the bottom of the wall.
- 4.2.2. **Each.** Wingwalls will be measured by each end of a structure.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the price bid for "Headwalls" of the type and pipe size (diameter or design) specified, "Wingwalls" of the type specified when measurement is by the square foot, or "Wingwalls" of the type and wall height specified when measurement is by each. For payment purposes, the wingwall height will be rounded to the nearest foot. All wingwalls and headwalls of the same type will be paid for equally when skew does not affect the type. This price is full compensation for constructing, furnishing, transporting, and installing the headwalls or wingwalls; connecting to existing structure; breaking back, removing and disposing of portions of the existing structure, and replacing portions of the existing structure as required to make connections; excavation and backfill; and concrete, reinforcing steel, corrugated metal pipe or reinforced concrete pipe, equipment, labor, tools, and incidentals.

Apron concrete or riprap between or around the wingwalls of single- or multiple-barrel box culvert structures will be measured and paid for in accordance with Item 432, "Riprap."

The removal and re-laying of existing pipe or the furnishing of new pipe to replace existing pipe will not be paid for directly but will be considered subsidiary to this Item.

Item 502

Barricades, Signs, and Traffic Handling

1. DESCRIPTION

Provide, install, move, replace, maintain, clean, and remove all traffic control devices shown on the plans and as directed.

2. CONSTRUCTION

Comply with the requirements of Article 7.2., "Safety."

Implement the traffic control plan (TCP) shown on the plans.

Install traffic control devices straight and plumb. Make changes to the TCP only as approved. Minor adjustments to meet field conditions are allowed.

Submit Contractor-proposed TCP changes, signed and sealed by a licensed professional engineer, for approval. The Engineer may develop, sign, and seal Contractor-proposed changes. Changes must conform to guidelines established in the TMUTCD using approved products from the Department's Compliant Work Zone Traffic Control Device List.

Maintain traffic control devices by taking corrective action when notified. Corrective actions include, but are not limited to, cleaning, replacing, straightening, covering, and removing devices. Maintain the devices such that they are properly positioned and spaced, legible, and have retroreflective characteristics that meet requirements day or night and in all weather conditions.

The Engineer may authorize or direct in writing the removal or relocation of project limit advance warning signs. When project limit advance warning signs are removed before final acceptance, provide traffic control in accordance with the TMUTCD for minor operations as approved.

Remove all traffic control devices upon completion of the work as shown on the plans or as directed.

3. MEASUREMENT

Barricades, Signs, and Traffic Handling will be measured by the month. Law enforcement personnel with patrol vehicles will be measured by the hour for each person.

4. PAYMENT

- 4.1. **Barricades, Signs, and Traffic Handling.** Except for Contracts with callout work and work orders, the work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Barricades, Signs, and Traffic Handling." This price is full compensation for installation, maintenance, adjustments, replacements, removal, materials, equipment, labor, tools, and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Barricades, Signs, and Traffic Handling."

This price is full compensation for installation, maintenance, adjustments, replacements, removal, materials, equipment, labor, tools, and incidentals.

When the plans establish pay items for particular work in the TCP, that work will be measured and paid under pertinent Items.

- 4.1.1. **Initiation of Payment.** Payment for this Item will begin on the first estimate after barricades, signs, and traffic handling devices have been installed in accordance with the TCP and construction has begun.
- 4.1.2. **Paid Months.** Monthly payment will be made each succeeding month for this Item provided the barricades, signs, and traffic handling devices have been installed and maintained in accordance with the TCP until the Contract amount has been paid.

If, within the time frame established by the Engineer, the Contractor fails to provide or properly maintain signs and barricades in compliance with the Contract requirements, as determined by the Engineer, the Contractor will be considered in noncompliance with this Item. No payment will be made for the months in question, and the total final payment quantity will be reduced by the number of months the Contractor was in noncompliance.

- 4.1.3. **Maximum Total Payment Before Acceptance.** The total payment for this Item will not exceed 10% of the total Contract amount before final acceptance in accordance with Article 5.12., "Final Acceptance." The remaining balance will be paid in accordance with Section 502.4.1.5., "Balance Due."
- 4.1.4. **Total Payment Quantity.** The quantity paid under this Item will not exceed the total quantity shown on the plans except as modified by change order and as adjusted by Section 502.4.1.2., "Paid Months." An overrun of the plans quantity for this Item will not be allowed for approving designs; testing; material shortages; closed construction seasons; curing periods; establishment, performance, test, and maintenance periods; failure to complete the work in the number of months allotted; nor delays caused directly or indirectly by requirements of the Contract.
- 4.1.5. **Balance Due.** The remaining unpaid months of barricades less non-compliance months will be paid on final acceptance of the project, if all work is complete and accepted in accordance with Article 5.12., "Final Acceptance."
- 4.1.6. **Contracts with Callout Work and Work Orders.** The work performed and the materials furnished with this Item and measured as provided under "Measurement," will be considered subsidiary to pertinent Items, except for federally funded Contracts.
- 4.2. **Law Enforcement Personnel.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement," will be paid by Contractor force account for "Law Enforcement Personnel." This price is full compensation for furnishing all labor, materials, supplies, equipment, patrol vehicle, fees, and incidentals necessary to complete the work as directed.

Item 506

Temporary Erosion, Sedimentation, and Environmental Controls

1. DESCRIPTION

Install, maintain, and remove erosion, sedimentation, and environmental control measures to prevent or reduce the discharge of pollutants in accordance with the Storm Water Pollution Prevention Plan (SWP3) on the plans and the Texas Pollutant Discharge Elimination System (TPDES) General Permit TXR150000.

Control measures are defined as Best Management Practices used to prevent or reduce the discharge of pollutants. Control measures include, but are not limited to, rock filter dams, temporary pipe slope drains, temporary paved flumes, construction exits, earthwork for erosion control, pipe, construction perimeter fence, sandbags, temporary sediment control fence, biodegradable erosion control logs, vertical tracking, temporary or permanent seeding, and other measures. Erosion and sediment control devices must be selected from the *Erosion Control Approved Products* or *Sediment Control Approved Products* lists. Perform work in a manner to prevent degradation of receiving waters, facilitate project construction, and comply with applicable federal, state, and local regulations. Ensure the installation and maintenance of control measures is performed in accordance with the manufacturer's or designer's specifications.

Provide the Contractor Certification of Compliance before performing SWP3 or soil disturbing activities. By signing the Contractor Certification of Compliance, the Contractor certifies they have read and understand the requirements applicable to this project pertaining to the SWP3, the plans, and the TPDES General Permit TXR150000. The Contractor is responsible for any penalties associated with non-performance of installation or maintenance activities required for compliance. Ensure the most current version of the certificate is executed for this project.

2. MATERIALS

Furnish materials in accordance with the following:

- Item 161, "Compost,"
- Item 432, "Riprap," and
- Item 556, "Pipe Underdrains."

2.1. Rock Filter Dams.

2.1.1. **Aggregate.** Furnish aggregate with approved hardness, durability, cleanliness, and resistance to crumbling, flaking, and eroding. Provide the following:

- Types 1, 2, and 4 Rock Filter Dams. Use 3 to 6 in. aggregate.
- Type 3 Rock Filter Dams. Use 4 to 8 in. aggregate.

2.1.2. **Wire.** Provide minimum 20 gauge galvanized wire for the steel wire mesh and tie wires for Types 2 and 3 rock filter dams. Type 4 dams require:

- a double-twisted, hexagonal weave with a nominal mesh opening of 2-1/2 × 3-1/4 in.;
- minimum 0.0866 in. steel wire for netting;
- minimum 0.1063 in. steel wire for selvages and corners; and
- minimum 0.0866 in. for binding or tie wire.

- 2.1.3. **Sandbag Material.** Furnish sandbags meeting Section 506.2.8., "Sandbags," except that any gradation of aggregate may be used to fill the sandbags.
- 2.2. **Temporary Pipe Slope Drains.** Provide corrugated metal pipe, polyvinyl chloride (PVC) pipe, flexible tubing, watertight connection bands, grommet materials, prefabricated fittings, and flared entrance sections that conform to the plans. Recycled and other materials meeting these requirements are allowed if approved.
- Furnish concrete in accordance with Item 432, "Riprap."
- 2.3. **Temporary Paved Flumes.** Furnish asphalt concrete, hydraulic cement concrete, or other comparable non-erodible material that conforms to the plans. Provide rock or rubble with a minimum diameter of 6 in. and a maximum volume of 1/2 cu. ft. for the construction of energy dissipaters.
- 2.4. **Construction Exits.** Provide materials that meet the details shown on the plans and this Section.
- 2.4.1. **Rock Construction Exit.** Provide crushed aggregate for long- and short-term construction exits. Furnish aggregates that are clean, hard, durable, and free from adherent coatings such as salt, alkali, dirt, clay, loam, shale, soft or flaky materials, and organic and injurious matter. Use 4- to 8-in. aggregate for Type 1. Use 2- to 4-in. aggregate for Type 3.
- 2.4.2. **Timber Construction Exit.** Furnish No. 2 quality or better railroad ties and timbers for long-term construction exits, free of large and loose knots and treated to control rot. Fasten timbers with nuts and bolts or lag bolts, of at least 1/2 in. diameter, unless otherwise shown on the plans or allowed. Provide plywood or pressed wafer board at least 1/2 in. thick for short-term exits.
- 2.4.3. **Foundation Course.** Provide a foundation course consisting of flexible base, bituminous concrete, hydraulic cement concrete, or other materials as shown on the plans or directed.
- 2.5. **Embankment for Erosion Control.** Provide rock, loam, clay, topsoil, or other earth materials that will form a stable embankment to meet the intended use.
- 2.6. **Pipe.** Provide pipe outlet material in accordance with Item 556, "Pipe Underdrains," and details shown on the plans.
- 2.7. **Construction Perimeter Fence.**
- 2.7.1. **Posts.** Provide essentially straight wood or steel posts that are at least 60 in. long. Furnish soft wood posts with a minimum diameter of 3 in., or use nominal 2 × 4 in. boards. Furnish hardwood posts with a minimum cross-section of 1-1/2 × 1-1/5 in. Furnish T- or L-shaped steel posts with a minimum weight of 1.25 lb. per foot.
- 2.7.2. **Fence.** Provide orange construction fencing as approved.
- 2.7.3. **Fence Wire.** Provide 14 gauge or larger galvanized smooth or twisted wire. Provide 16 gauge or larger tie wire.
- 2.7.4. **Flagging.** Provide brightly-colored flagging that is fade-resistant and at least 3/4 in. wide to provide maximum visibility both day and night.
- 2.7.5. **Staples.** Provide staples with a crown at least 1/2 in. wide and legs at least 1/2 in. long.
- 2.7.6. **Used Materials.** Previously used materials meeting the applicable requirements may be used if approved.
- 2.8. **Sandbags.** Provide sandbag material of polypropylene, polyethylene, or polyamide woven fabric with a minimum unit weight of 4 oz. per square yard, a Mullen burst-strength exceeding 300 psi, and an ultraviolet stability exceeding 70%.

Use natural coarse sand or manufactured sand meeting the gradation given in Table 1 to fill sandbags. Filled sandbags must be 24 to 30 in. long, 16 to 18 in. wide, and 6 to 8 in. thick.

**Table 1
Sand Gradation**

Sieve Size	Retained (% by Weight)
#4	Maximum 3%
#100	Minimum 80%
#200	Minimum 95%

Aggregate may be used instead of sand for situations where sandbags are not adjacent to traffic. The aggregate size must not exceed 3/8 in.

- 2.9 **Temporary Sediment Control Fence.** Provide a net-reinforced fence using woven geo-textile fabric. Logos visible to the traveling public will not be allowed.
- 2.9.1 **Fabric.** Provide fabric materials in accordance with [DMS-6230](#), "Temporary Sediment Control Fence Fabric."
- 2.9.2 **Posts.** Provide essentially straight wood or steel posts with a minimum length of 48 in., unless otherwise shown on the plans. Furnish soft wood posts at least 3 in. in diameter, or use nominal 2 × 4 in. boards. Furnish hardwood posts with a minimum cross-section of 1-1/2 × 1-1/2 in. Furnish T- or L-shaped steel posts with a minimum weight of 1.25 lb. per foot.
- 2.9.3 **Net Reinforcement.** Provide net reinforcement of at least 12.5 gauge (SWG) galvanized welded wire mesh, with a maximum opening size of 2 × 4 in., at least 24 in. wide, unless otherwise shown on the plans.
- 2.9.4 **Staples.** Provide staples with a crown at least 3/4 in. wide and legs 1/2 in. long.
- 2.9.5 **Used Materials.** Use recycled material meeting the applicable requirements if approved.
- 2.10. **Biodegradable Erosion Control Logs.**
- 2.10.1. **Core Material.** Furnish core material that is biodegradable or recyclable. Use compost, mulch, aspen excelsior wood fibers, chipped site vegetation, agricultural rice or wheat straw, coconut fiber, 100% recyclable fibers, or any other acceptable material unless specifically called out on the plans. Permit no more than 5% of the material to escape from the containment mesh. Furnish compost meeting the requirements of Item 161, "Compost."
- 2.10.2. **Containment Mesh.** Furnish containment mesh that is 100% biodegradable, photodegradable, or recyclable such as burlap, twine, UV photodegradable plastic, polyester, or any other acceptable material.
- Furnish biodegradable or photodegradable containment mesh when log will remain in place as part of a vegetative system.
- Furnish recyclable containment mesh for temporary installations.
- 2.10.3. **Size.** Furnish biodegradable erosion control logs with diameters shown on the plans or as directed. Stuff containment mesh densely so logs do not deform.

3. QUALIFICATIONS, TRAINING, AND EMPLOYEE REQUIREMENTS

- 3.1. **Contractor Responsible Person Environmental (CRPE) Qualifications and Responsibilities.** Provide and designate in writing at the preconstruction conference a CRPE and alternate CRPE who have overall responsibility for the storm water management program. The CRPE will implement storm water and erosion control practices; will oversee and observe storm water control measure monitoring and management; will monitor the project site daily and produce daily monitoring reports as long as there are BMPs in place or soil disturbing activities are evident to ensure compliance with the SWP3 and TPDES General Permit TXR150000. During time suspensions when work is not occurring or on contract non-work days, daily inspections are not required unless a rain event has occurred. The CRPE will provide recommendations on how to improve the effectiveness of control measures. Attend the Department's preconstruction conference for the project. Ensure training is completed as identified in Section 506.3.3., "Training," by all applicable personnel before employees work on the project. Document and submit a list, signed by the CRPE, of all applicable Contractor and subcontractor employees who have completed the training. Include the employee's name, the training course name, and date the employee completed the training. Provide the most current list at the preconstruction conference or before SWP3 or soil disturbing activities. Update the list as needed and provide the updated list when updated.
- 3.2. **Contractor Superintendent Qualifications and Responsibilities.** Provide a superintendent that is competent, has experience with and knowledge of storm water management, and is knowledgeable of the requirements and the conditions of the TPDES General Permit TXR150000. The superintendent will manage and oversee the day to day operations and activities at the project site; work with the CRPE to provide effective storm water management at the project site; represent and act on behalf of the Contractor; and attend the Department's preconstruction conference for the project.
- 3.1 **Training.** All Contractor and subcontractor employees involved in soil disturbing activities, small or large structures, storm water control measures, and seeding activities must complete training as prescribed by the Department.

4. CONSTRUCTION

- 4.1 **Contractor Responsibilities.** Implement the SWP3 for the project site in accordance with the plans and specifications, TPDES General Permit TXR150000, and as directed. Coordinate storm water management with all other work on the project. Develop and implement an SWP3 for project-specific material supply plants within and outside of the Department's right of way in accordance with the specific or general storm water permit requirements. Prevent water pollution from storm water associated with construction activity from entering any surface water or private property on or adjacent to the projectsite.
- 4.2 **Implementation.** The CRPE, or alternate CRPE, must be accessible by phone and able to respond to project-related storm water management or other environmental emergencies 24 hr. per day.
- 4.2.1 **Commencement.** Implement the SWP3 as shown and as directed. Contractor-proposed recommendations for changes will be allowed as approved. Conform to the established guidelines in the TPDES General Permit TXR150000 to make changes. Do not implement changes until approval has been received and changes have been incorporated into the plans. Minor adjustments to meet field conditions are allowed and will be recorded in the SWP3.
- 4.2.2 **Phasing.** Implement control measures before the commencement of activities that result in soil disturbance. Phase and minimize the soil disturbance to the areas shown on the plans. Coordinate temporary control measures with permanent control measures and all other work activities on the project to assure economical, effective, safe, and continuous water pollution prevention. Provide control measures that are appropriate to the construction means, methods, and sequencing allowed by the Contract. Exercise precaution throughout the life of the project to prevent pollution of ground waters and

surface waters. Schedule and perform clearing and grubbing operations so that stabilization measures will follow immediately thereafter if project conditions permit. Bring all grading sections to final grade as soon as possible and implement temporary and permanent control measures at the earliest time possible. Implement temporary control measures when required by the TPDES General Permit TXR150000 or otherwise necessitated by project conditions.

Do not prolong final grading and shaping. Preserve vegetation where possible throughout the project, and minimize clearing, grubbing, and excavation within stream banks, bed, and approach sections.

4.3 **General.**

4.3.1 **Temporary Alterations or Control Measure Removal.** Altering or removal of control measures is allowed when control measures are restored within the same working day.

4.3.2 **Stabilization.** Initiate stabilization for disturbed areas no more than 14 days after the construction activities in that portion of the site have temporarily or permanently ceased. Establish a uniform vegetative cover or use another stabilization practice in accordance with the TPDES General Permit TXR150000.

4.3.3 **Finished Work.** Remove and dispose of all temporary control measures upon acceptance of vegetative cover or other stabilization practice unless otherwise directed. Complete soil disturbing activities and establish a uniform perennial vegetative cover. A project will not be considered for acceptance until a vegetative cover of 70% density of existing adjacent undisturbed areas is obtained or equivalent permanent stabilization is obtained in accordance with the TPDES General Permit TXR150000. An exception will be allowed in arid areas as defined in the TPDES General Permit TXR150000.

4.3.4 **Restricted Activities and Required Precautions.** Do not discharge onto the ground or surface waters any pollutants such as chemicals, raw sewage, fuels, lubricants, coolants, hydraulic fluids, bitumens, or any other petroleum product. Operate and maintain equipment on-site to prevent actual or potential water pollution. Manage, control, and dispose of litter on-site such that no adverse impacts to water quality occur. Prevent dust from creating a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property. Wash out concrete trucks only as described in the TPDES General Permit TXR150000. Use appropriate controls to minimize the offsite transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water (i.e., dewatering). Prevent discharges that would contribute to a violation of Edwards Aquifer Rules, water quality standards, the impairment of a listed water body, or other state or federal law.

4.4 **Installation, Maintenance, and Removal Work.** Perform work in accordance with the SWP3, according to manufacturers' guidelines, and in accordance with the TPDES General Permit TXR150000. Install and maintain the integrity of temporary erosion and sedimentation control devices to accumulate silt and debris until soil disturbing activities are completed and permanent erosion control features are in place or the disturbed area has been adequately stabilized as approved.

The Department will inspect and document the condition of the control measures at the frequency shown on the plans and will provide the Construction SWP3 Field Inspection and Maintenance Reports to the Contractor. Make corrections as soon as possible before the next anticipated rain event or within 7 calendar days after being able to enter the worksite for each control measure. The only acceptable reason for not accomplishing the corrections with the time frame specified is when site conditions are "Too Wet to Work." Take immediate action if a correction is deemed critical as directed. When corrections are not made within the established time frame, all work will cease on the project and time charges will continue while the control measures are brought into compliance. Commence work once the Engineer reviews and documents the project is in compliance. Commencing work does not release the Contractor of the liability for noncompliance of the SWP3, plans, or TPDES General Permit TXR150000.

The Engineer may limit the disturbed area if the Contractor cannot control soil erosion and sedimentation resulting from the Contractor's operations. Implement additional controls as directed.

Remove devices upon approval or as directed. Finish-grade and dress the area upon removal. Stabilize disturbed areas in accordance with the permit, and as shown on the plans or directed. Materials removed are considered consumed by the project. Retain ownership of stockpiled material and remove it from the project when new installations or replacements are no longer required.

- 4.4.1 **Rock Filter Dams for Erosion Control.** Remove trees, brush, stumps, and other objectionable material that may interfere with the construction of rock filter dams. Place sandbags as a foundation when required or at the Contractor's option.

Place the aggregate to the lines, height, and slopes specified, without undue voids for Types 1, 2, 3, and 5. Place the aggregate on the mesh and then fold the mesh at the upstream side over the aggregate and secure it to itself on the downstream side with wire ties, or hog rings for Types 2 and 3, or as directed. Place rock filter dams perpendicular to the flow of the stream or channel unless otherwise directed. Construct filter dams according to the criteria unless otherwise shown on the plans:

4.4.1.1 **Type 1 (Non-Reinforced).**

- **Height.** At least 18 in. measured vertically from existing ground to top of filter dam.
- **Top Width.** At least 2 ft.
- **Slopes.** No steeper than 2:1.

4.4.1.2 **Type 2 (Reinforced).**

- **Height.** At least 18 in. measured vertically from existing ground to top of filter dam.
- **Top Width.** At least 2 ft.
- **Slopes.** No steeper than 2:1.

4.4.1.3 **Type 3 (Reinforced).**

- **Height.** At least 36 in. measured vertically from existing ground to top of filter dam.
- **Top Width.** At least 2 ft.
- **Slopes.** No steeper than 2:1.

- 4.4.1.4 **Type 4 (Sack Gabions).** Unfold sack gabions and smooth out kinks and bends. Connect the sides by lacing in a single loop–double loop pattern on 4- to 5-in. spacing for vertical filling. Pull the end lacing rod at one end until tight, wrap around the end, and twist 4 times. Fill with stone at the filling end, pull the rod tight, cut the wire with approximately 6 in. remaining, and twist wires 4 times.

Place the sack flat in a filling trough, fill with stone, connect sides, and secure ends as described above for horizontal filling.

Lift and place without damaging the gabion. Shape sack gabions to existing contours.

- 4.4.1.5 **Type 5.** Provide rock filter dams as shown on the plans.

- 4.4.2 **Temporary Pipe Slope Drains.** Install pipe with a slope as shown on the plans or as directed. Construct embankment for the drainage system in 8-in. lifts to the required elevations. Hand-tamp the soil around and under the entrance section to the top of the embankment as shown on the plans or as directed. Form the top of the embankment or earth dike over the pipe slope drain at least 1 ft. higher than the top of the inlet pipe at all points. Secure the pipe with hold-downs or hold-down grommets spaced a maximum of 10 ft. on center. Construct the energy dissipaters or sediment traps as shown on the plans or as directed. Construct the sediment trap using concrete or rubble riprap in accordance with Item 432, "Riprap," when designated on the plans.

- 4.4.3 **Temporary Paved Flumes.** Construct paved flumes as shown on the plans or as directed. Provide excavation and embankment (including compaction of the subgrade) of material to the dimensions shown on the plans unless otherwise indicated. Install a rock or rubble riprap energy dissipater, constructed from

the materials specified above, to a minimum depth of 9 in. at the flume outlet to the limits shown on the plans or as directed.

- 4.4.4 **Construction Exits.** Prevent traffic from crossing or exiting the construction site or moving directly onto a public roadway, alley, sidewalk, parking area, or other right of way areas other than at the location of construction exits when tracking conditions exist. Construct exits for either long- or short-term use.
 - 4.4.4.1. **Long-Term.** Place the exit over a foundation course as required. Grade the foundation course or compacted subgrade to direct runoff from the construction exits to a sediment trap as shown on the plans or as directed. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed.
 - 4.4.4.1.1. **Type 1.** Construct to a depth of at least 8 in. using crushed aggregate as shown on the plans or as directed.
 - 4.4.4.1.2. **Type 2.** Construct using railroad ties and timbers as shown on the plans or as directed.
 - 4.4.4.2. **Short-Term.**
 - 4.4.4.2.1. **Type 3.** Construct using crushed aggregate, plywood, or wafer board. This type of exit may be used for daily operations where long-term exits are not practical.
 - 4.4.4.2.2. **Type 4.** Construct as shown on the plans or as directed.
- 4.4.5. **Earthwork for Erosion Control.** Perform excavation and embankment operations to minimize erosion and to remove collected sediments from other erosion control devices.
 - 4.4.5.1. **Excavation and Embankment for Erosion Control Features.** Place earth dikes, swales, or combinations of both along the low crown of daily lift placement, or as directed, to prevent runoff spillover. Place swales and dikes at other locations as shown on the plans or as directed to prevent runoff spillover or to divert runoff. Construct cuts with the low end blocked with undisturbed earth to prevent erosion of hillsides. Construct sediment traps at drainage structures in conjunction with other erosion control measures as shown on the plans or as directed.

Create a sediment basin, where required, providing 3,600 cu. ft. of storage per acre drained, or equivalent control measures for drainage locations that serve an area with 10 or more disturbed acres at one time, not including offsite areas.
 - 4.4.5.2. **Excavation of Sediment and Debris.** Remove sediment and debris when accumulation affects the performance of the devices, after a rain, and when directed.
- 4.4.6 **Construction Perimeter Fence.** Construct, align, and locate fencing as shown on the plans or as directed.
 - 4.4.6.1 **Installation of Posts.** Embed posts 18 in. deep or adequately anchor in rock, with a spacing of 8 to 10 ft.
 - 4.4.6.2 **Wire Attachment.** Attach the top wire to the posts at least 3 ft. from the ground. Attach the lower wire midway between the ground and the top wire.
 - 4.4.6.3 **Flag Attachment.** Attach flagging to both wire strands midway between each post. Use flagging at least 18 in. long. Tie flagging to the wire using a square knot.
- 4.4.7 **Sandbags for Erosion Control.** Construct a berm or dam of sandbags that will intercept sediment-laden storm water runoff from disturbed areas, create a retention pond, detain sediment, and release water in sheet flow. Fill each bag with sand so that at least the top 6 in. of the bag is unfilled to allow for proper tying of the open end. Place the sandbags with their tied ends in the same direction. Offset subsequent rows of sandbags 1/2 the length of the preceding row. Place a single layer of sandbags downstream as a

secondary debris trap. Place additional sandbags as necessary or as directed for supplementary support to berms or dams of sandbags on earth.

- 4.4.8 **Temporary Sediment-Control Fence.** Provide temporary sediment-control fence near the downstream perimeter of a disturbed area to intercept sediment from sheet flow. Incorporate the fence into erosion-control measures used to control sediment in areas of higher flow. Install the fence as shown on the plans, as specified in this Section, or as directed.
- 4.4.8.1 **Installation of Posts.** Embed posts at least 18 in. deep, or adequately anchor, if in rock, with a spacing of 6 to 8 ft. and install on a slight angle toward the runoff source.
- 4.4.8.2 **Fabric Anchoring.** Dig trenches along the uphill side of the fence to anchor 6 to 8 in. of fabric. Provide a minimum trench cross-section of 6 × 6 in. Place the fabric against the side of the trench and align approximately 2 in. of fabric along the bottom in the upstream direction. Backfill the trench, then hand-tamp.
- 4.4.8.3 **Fabric and Net Reinforcement Attachment.** Attach the reinforcement to wooden posts with staples, or to steel posts with T-clips, in at least 4 places equally spaced unless otherwise shown on the plans. Sewn vertical pockets may be used to attach reinforcement to end posts. Fasten the fabric to the top strand of reinforcement by hog rings or cord every 15 in. or less.
- 4.4.8.4. **Fabric and Net Splices.** Locate splices at a fence post with a minimum lap of 6 in. attached in at least 6 places equally spaced unless otherwise shown on the plans. Do not locate splices in concentrated flow areas.

Requirements for installation of used temporary sediment-control fence include the following:

- fabric with minimal or no visible signs of biodegradation (weak fibers),
- fabric without excessive patching (more than 1 patch every 15 to 20 ft.),
- posts without bends, and
- backing without holes.

- 4.4.9 **Biodegradable Erosion Control Logs.** Install biodegradable erosion control logs near the downstream perimeter of a disturbed area to intercept sediment from sheet flow. Incorporate the biodegradable erosion control logs into the erosion measures used to control sediment in areas of higher flow. Install, align, and locate the biodegradable erosion control logs as specified below, as shown on the plans, or as directed.

Secure biodegradable erosion control logs in a method adequate to prevent displacement as a result of normal rain events, prevent damage to the logs, and as approved, such that flow is not allowed under the logs. Temporarily removing and replacing biodegradable erosion logs as to facilitate daily work is allowed at the Contractor's expense.

- 4.4.10 **Vertical Tracking.** Perform vertical tracking on slopes to temporarily stabilize soil. Provide equipment with a track undercarriage capable of producing a linear soil impression measuring a minimum of 12 in. long × 2 to 4 in. wide × 1/2 to 2 in. deep. Do not exceed 12 in. between track impressions. Install continuous linear track impressions where the 12 in. length impressions are perpendicular to the slope. Vertical tracking is required on projects where soil disturbing activities have occurred unless otherwise approved.
- 4.5. **Monitoring and Documentation.** Monitor the control measures on a daily basis as long as there are BMPs in place and/or soil disturbing activities are evident to ensure compliance with the SWP3 and TPDES General Permit TXR150000. During time suspensions when work is not occurring or contract non-work days, daily inspections are not required unless a rain event has occurred. Monitoring will consist of, but is not limited to, observing, inspecting, and documenting site locations with control measures and discharge points to provide maintenance and inspection of controls as described in the SWP3. Keep written records of daily monitoring. Document in the daily monitoring report the control measure condition, the date of inspection, required corrective actions, responsible person for making the corrections, and the date corrective actions were completed. Maintain records of all monitoring reports at the project site or at

an approved place. Provide copies within 7 days. Together, the CRPE and an Engineer's representative will complete the Construction Stage Gate Checklist on a periodic basis as directed.

5. MEASUREMENT

- 5.1 **Rock Filter Dams.** Installation or removal of rock filter dams will be measured by the foot or by the cubic yard. The measured volume will include sandbags, when used.
- 5.1.1 **Linear Measurement.** When rock filter dams are measured by the foot, measurement will be along the centerline of the top of the dam.
- 5.1.2 **Volume Measurement.** When rock filter dams are measured by the cubic yard, measurement will be based on the volume of rock computed by the method of average end areas.
- 5.1.2.1 **Installation.** Measurement will be made in final position.
- 5.1.2.2 **Removal.** Measurement will be made at the point of removal.
- 5.2 **Temporary Pipe Slope Drains.** Temporary pipe slope drains will be measured by the foot.
- 5.3 **Temporary Paved Flumes.** Temporary paved flumes will be measured by the square yard of surface area. The measured area will include the energy dissipater at the flume outlet.
- 5.4 **Construction Exits.** Construction exits will be measured by the square yard of surface area.
- 5.5 **Earthwork for Erosion and Sediment Control.**
- 5.5.1 **Equipment and Labor Measurement.** Equipment and labor used will be measured by the actual number of hours the equipment is operated and the labor is engaged in the work.
- 5.5.2 **Volume Measurement.**
- 5.5.2.1 **In Place.**
- 5.5.2.1.1 **Excavation.** Excavation will be measured by the cubic yard in its original position and the volume computed by the method of average end areas.
- 5.5.2.1.2 **Embankment.** Embankment will be measured by the cubic yard in its final position by the method of average end areas. The volume of embankment will be determined between:
- the original ground surfaces or the surface upon that the embankment is to be constructed for the feature and
 - the lines, grades and slopes of the accepted embankment for the feature.
- 5.5.2.2 **In Vehicles.** Excavation and embankment quantities will be combined and paid for under "Earthwork (Erosion and Sediment Control, In Vehicle)." Excavation will be measured by the cubic yard in vehicles at the point of removal. Embankment will be measured by the cubic yard in vehicles measured at the point of delivery. Shrinkage or swelling factors will not be considered in determining the calculated quantities.
- 5.6 **Construction Perimeter Fence.** Construction perimeter fence will be measured by the foot.
- 5.7 **Sandbags for Erosion Control.** Sandbags will be measured as each sandbag or by the foot along the top of sandbag berms or dams.
- 5.8 **Temporary Sediment-Control Fence.** Installation or removal of temporary sediment-control fence will be measured by the foot.

- 5.9 **Biodegradable Erosion Control Logs.** Installation or removal of biodegradable erosion control logs will be measured by the foot along the centerline of the top of the control logs.
- 5.10 **Vertical Tracking.** Vertical tracking will not be measured or paid for directly but is considered subsidiary to this Item.

6. PAYMENT

The following will not be paid for directly but are subsidiary to pertinent Items:

- erosion-control measures for Contractor project-specific locations (PSLs) inside and outside the right of way (such as construction and haul roads, field offices, equipment and supply areas, plants, and material sources);
- removal of litter, unless a separate pay item is shown on the plans;
- repair to devices and features damaged by Contractor operations;
- added measures and maintenance needed due to negligence, carelessness, lack of maintenance, and failure to install permanent controls;
- removal and reinstallation of devices and features needed for the convenience of the Contractor;
- finish grading and dressing upon removal of the device; and
- minor adjustments including but not limited to plumbing posts, reattaching fabric, minor grading to maintain slopes on an erosion embankment feature, or moving small numbers of sandbags.

Stabilization of disturbed areas will be paid for under pertinent Items except vertical tacking which is subsidiary.

Furnishing and installing pipe for outfalls associated with sediment traps and ponds will not be paid for directly but is subsidiary to the excavation and embankment under this Item.

- 6.1 **Rock Filter Dams.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid as follows:
- 6.1.1 **Installation.** Installation will be paid for as "Rock Filter Dams (Install)" of the type specified. This price is full compensation for furnishing and operating equipment, finish backfill and grading, lacing, proper disposal, labor, materials, tools, and incidentals.
- 6.1.2 **Removal.** Removal will be paid for as "Rock Filter Dams (Remove)." This price is full compensation for furnishing and operating equipment, proper disposal, labor, materials, tools, and incidentals.

When the Engineer directs that the rock filter dam installation or portions thereof be replaced, payment will be made at the unit price bid for "Rock Filter Dams (Remove)" and for "Rock Filter Dams (Install)" of the type specified. This price is full compensation for furnishing and operating equipment, finish backfill and grading, lacing, proper disposal, labor, materials, tools, and incidentals.

- 6.2 **Temporary Pipe Slope Drains.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Temporary Pipe Slope Drains" of the size specified. This price is full compensation for furnishing materials, removal and disposal, furnishing and operating equipment, labor, tools, and incidentals.

Removal of temporary pipe slope drains will not be paid for directly but is subsidiary to the installation Item. When the Engineer directs that the pipe slope drain installation or portions thereof be replaced, payment will be made at the unit price bid for "Temporary Pipe Slope Drains" of the size specified, which is full compensation for the removal and reinstallation of the pipe drain.

Earthwork required for the pipe slope drain installation, including construction of the sediment trap, will be measured and paid for under "Earthwork for Erosion and Sediment Control."

Riprap concrete or stone, when used as an energy dissipater or as a stabilized sediment trap, will be measured and paid for in accordance with Item 432, "Riprap."

- 6.3 **Temporary Paved Flumes.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Temporary Paved Flume (Install)" or "Temporary Paved Flume (Remove)." This price is full compensation for furnishing and placing materials, removal and disposal, equipment, labor, tools, and incidentals.

When the Engineer directs that the paved flume installation or portions thereof be replaced, payment will be made at the unit prices bid for "Temporary Paved Flume (Remove)" and "Temporary Paved Flume (Install)." These prices are full compensation for the removal and replacement of the paved flume and for equipment, labor, tools, and incidentals.

Earthwork required for the paved flume installation, including construction of a sediment trap, will be measured and paid for under "Earthwork for Erosion and Sediment Control."

- 6.4 **Construction Exits.** Contractor-required construction exits from off right of way locations or on-right of way PSLs will not be paid for directly but are subsidiary to pertinent Items.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for construction exits needed on right of way access to work areas required by the Department will be paid for at the unit price bid for "Construction Exits (Install)" of the type specified or "Construction Exits (Remove)." This price is full compensation for furnishing and placing materials, excavating, removal and disposal, cleaning vehicles, labor, tools, and incidentals.

When the Engineer directs that a construction exit or portion thereof be removed and replaced, payment will be made at the unit prices bid for "Construction Exit (Remove)" and "Construction Exit (Install)" of the type specified. These prices are full compensation for the removal and replacement of the construction exit and for equipment, labor, tools, and incidentals.

Construction of sediment traps used in conjunction with the construction exit will be measured and paid for under "Earthwork for Erosion and Sediment Control."

- 6.5 **Earthwork for Erosion and Sediment Control.**

- 6.5.1 **Initial Earthwork for Erosion and Sediment Control.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Excavation (Erosion and Sediment Control, In Place)," "Embankment (Erosion and Sediment Control, In Place)," "Excavation (Erosion and Sediment Control, In Vehicle)," "Embankment (Erosion and Sediment Control, (In Vehicle)," or "Earthwork (Erosion and Sediment Control, In Vehicle)."

This price is full compensation for excavation and embankment including hauling, disposal of material not used elsewhere on the project; embankments including furnishing material from approved sources and construction of erosion-control features; and equipment, labor, tools, and incidentals.

Sprinkling and rolling required by this Item will not be paid for directly but will be subsidiary to this Item.

- 6.5.2 **Maintenance Earthwork for Erosion and Sediment Control for Cleaning and Restoring Control Measures.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid under a Contractor Force Account Item from invoice provided to the Engineer.

This price is full compensation for excavation, embankment, and re-grading including removal of accumulated sediment in various erosion control installations as directed, hauling, and disposal of material not used elsewhere on the project; excavation for construction of erosion-control features; embankments including furnishing material from approved sources and construction of erosion-control features; and equipment, labor, tools, and incidentals.

Earthwork needed to remove and obliterate erosion-control features will not be paid for directly but is subsidiary to pertinent Items unless otherwise shown on the plans.

Sprinkling and rolling required by this Item will not be paid for directly but will be subsidiary to this Item.

- 6.6 **Construction Perimeter Fence.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Construction Perimeter Fence." This price is full compensation for furnishing and placing the fence; digging, fence posts, wire, and flagging; removal and disposal; and materials, equipment, labor, tools, and incidentals.

Removal of construction perimeter fence will be not be paid for directly but is subsidiary to the installation Item. When the Engineer directs that the perimeter fence installation or portions thereof be removed and replaced, payment will be made at the unit price bid for "Construction Perimeter Fence," which is full compensation for the removal and reinstallation of the construction perimeter fence.

- 6.7 **Sandbags for Erosion Control.** Sandbags will be paid for at the unit price bid for "Sandbags for Erosion Control" (of the height specified when measurement is by the foot). This price is full compensation for materials, placing sandbags, removal and disposal, equipment, labor, tools, and incidentals.

Removal of sandbags will not be paid for directly but is subsidiary to the installation Item. When the Engineer directs that the sandbag installation or portions thereof be replaced, payment will be made at the unit price bid for "Sandbags for Erosion Control," which is full compensation for the reinstallation of the sandbags.

- 6.8 **Temporary Sediment-Control Fence.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid as follows:

- 6.8.1 **Installation.** Installation will be paid for as "Temporary Sediment-Control Fence (Install)." This price is full compensation for furnishing and operating equipment finish backfill and grading, lacing, proper disposal, labor, materials, tools, and incidentals.

- 6.8.2 **Removal.** Removal will be paid for as "Temporary Sediment-Control Fence (Remove)." This price is full compensation for furnishing and operating equipment, proper disposal, labor, materials, tools, and incidentals.

- 6.9 **Biodegradable Erosion Control Logs.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid as follows:

- 6.9.1 **Installation.** Installation will be paid for as "Biodegradable Erosion Control Logs (Install)" of the size specified. This price is full compensation for furnishing and operating equipment finish backfill and grading, staking, proper disposal, labor, materials, tools, and incidentals.

- 6.9.2 **Removal.** Removal will be paid for as "Biodegradable Erosion Control Logs (Remove)." This price is full compensation for furnishing and operating equipment, proper disposal, labor, materials, tools, and incidentals.

- 6.10 **Vertical Tracking.** Vertical tracking will not be measured or paid for directly but is considered subsidiary to this Item.

Item 529

Concrete Curb, Gutter, and Combined Curb and Gutter

1. DESCRIPTION

Construct hydraulic cement concrete curb, gutter, and combined curb and gutter.

2. MATERIALS

Furnish materials conforming to:

- Item 360, "Concrete Pavement"
- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete"
- Item 440, "Reinforcement for Concrete"

Use Class A concrete or material specified on the plans. Use Grade 8 coarse aggregate for extruded Class A concrete. Use other grades if approved.

When approved, use fibers meeting the requirements of [DMS-4550](#), "Fibers for Concrete," to replace reinforcing steel in Class A concrete. Dose fibers in accordance with the Department's MPL of pre-qualified fibers for concrete.

3. CONSTRUCTION

Provide finished work with a well-compacted mass and a surface free from voids and honeycomb, in the required shape, line, and grade. Round exposed edges with an edging tool of the radius shown on the plans. Mix, place, and cure concrete in accordance with Item 420, "Concrete Substructures." Construct joints at locations shown on the plans. Cure for at least 72 hr.

Furnish and place reinforcing steel in accordance with Item 440, "Reinforcement for Concrete."

Set and maintain a guideline that conforms to alignment data shown on the plans, with an outline that conforms to the details shown on the plans. Ensure that changes in curb grade and alignment do not exceed 1/4 in. between any 2 contacts on a 10-ft. straightedge.

- 3.1. **Conventionally Formed Concrete.** Shape and compact subgrade, foundation, or pavement surface to the line, grade, and cross-section shown on the plans. Lightly sprinkle subgrade or foundation material immediately before concrete placement.

Pour concrete into forms, and strike off with a template 1/4 to 3/8 in. less than the dimensions of the finished curb unless otherwise approved. After initial set, plaster surface with mortar consisting of 1 part hydraulic cement and 2 parts fine aggregate. Brush exposed surfaces to a uniform texture.

Place curbs, gutters, and combined curb and gutters in 50-ft. maximum sections unless otherwise approved.

- 3.2. **Extruded or Slipformed Concrete.** Hand-tamp and sprinkle subgrade or foundation material before concrete placement. Provide clean surfaces for concrete placement. Coat cleaned surfaces, if required, with approved adhesive or coating at the rate of application shown on the plans or as directed. Place concrete with approved self-propelled equipment.

The forming tube of the extrusion machine or the form of the slipform machine must be easily adjustable vertically during the forward motion of the machine to provide variable heights necessary to conform to the established gradeline.

Attach a pointer or gauge to the machine so that a continual comparison can be made between the extruded or slipform work and the grade guideline. Other methods may be used when approved.

Finish surfaces immediately after extrusion or slipforming.

4. MEASUREMENT

This Item will be measured by the foot.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Curb," "Concrete Curb (Mono)," or "Concrete Curb and Gutter" of the type specified. This price is full compensation for surface preparation of curb foundation, equipment, labor, materials, tools, and incidentals.

Item 531

Sidewalks

1. DESCRIPTION

Construct hydraulic cement concrete sidewalks.

2. MATERIALS

Furnish materials conforming to the following:

- Item 360, "Concrete Pavement"
- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete"
- Item 440, "Reinforcement for Concrete"

Use Class A concrete unless otherwise shown on the plans. Use Grade 8 course aggregate for extruded Class A concrete. Use other grades if approved.

3. CONSTRUCTION

Shape and compact subgrade, foundation, or pavement surface to the line, grade, and cross-section shown on the plans. Lightly sprinkle subgrade or foundation material immediately before concrete placement. Hand-tamp and sprinkle foundation when placement is directly on subgrade or foundation materials. Remove and dispose of existing concrete in accordance with Item 104, "Removing Concrete." Provide a clean surface for concrete placement directly on the surface material or pavement.

Mix and place concrete in accordance with the pertinent Items. Hand-finishing is allowed for any method of construction. Finish exposed surfaces to a uniform transverse broom finish surface. Curb ramps must include a detectable warning surface and conform to details shown on the plans. Install joints as shown on the plans. Ensure that abrupt changes in sidewalk elevation do not exceed 1/4 in., sidewalk cross slope does not exceed 2%, curb ramp grade does not exceed 8.3%, and flares adjacent to the ramp do not exceed 10% slope. Ensure that the sidewalk depth and reinforcement are not less than the driveway cross-sectional details shown on the plans where a sidewalk crosses a concrete driveway.

Provide finished work with a well-compacted mass, a surface free from voids and honeycomb, and the required true-to-line shape and grade. Cure for at least 72 hr. in accordance with Item 420, "Concrete Substructures."

- 3.1 **Conventionally Formed Concrete.** Provide pre-molded or board expansion joints of the thickness shown on the plans for sidewalk section lengths greater than 8 ft. but less than 40 ft., unless otherwise directed. Terminate workday production at an expansion joint.
- 3.2 **Extruded or Slipformed Concrete.** Provide any additional surface finishing immediately after extrusion or slipforming as required on the plans. Construct joints at locations as shown on the plans or as directed.

4.

MEASUREMENT

Sidewalks will be measured by the square yard of surface area. Curb ramps will be measured by the square yard of surface area or by each. A curb ramp consists of the ramp, landing, adjacent flares or side curb, and detectable warning surface as shown on the plans.

5.

PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Sidewalks" of the depth specified and "Curb Ramps" of the type specified. This price is full compensation for surface preparation of sidewalk foundation; materials; removal and disposal of existing concrete; excavation, hauling and disposal of excavated material; drilling and doweling into existing concrete curb, sidewalk, and pavement; repair of adjacent street or pavement structure damaged by these operations; and equipment, labor, materials, tools, and incidentals.

Sidewalks that cross and connect to concrete driveways or turnouts will be measured and paid for in accordance with Item 530, "Intersections, Driveways, and Turnouts."

Item 536

Concrete Medians and Directional Islands

1. DESCRIPTION

Construct cast-in-place concrete medians and directional islands.

2. MATERIALS

Furnish materials in accordance with the following:

- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete"
- Item 440, "Reinforcement for Concrete"
- Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."

Use Class A concrete unless otherwise shown on the plans.

When approved, use fibers meeting the requirements of [DMS-4550](#), "Fibers for Concrete," to replace reinforcing steel in Class A concrete. Dose fibers in accordance with the Department's MPL of pre-qualified fibers for concrete.

3. CONSTRUCTION

Provide wood or metal forms securely held in place. Properly position and secure reinforcing steel and dowels. Place concrete for each section on the prepared foundation to line, grade, and cross-section in accordance with Item 420, "Concrete Substructures." Separate sections from adjacent curbs or adjoining sections using expansion or contraction joints of the type and size specified on the plans. A curb section may be used for the perimeter of the median or island when shown. Construct curbs in conformance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."

Finish exposed surfaces with a wood or metal float after sufficient concrete set. Round exposed edges as shown on the plans.

Remove forms after concrete has set. Point up exposed surfaces. Provide an ordinary surface finish in accordance with Item 427, "Surface Finishes for Concrete." Use mortar consisting of 1 part hydraulic cement and 2 parts fine aggregate to plaster exposed formed surfaces when required. Apply the mortar with a template made to conform to the cross-section shown on the plans.

Cure at least 72 hr. using a method specified in Item 420, "Concrete Substructures."

4. MEASUREMENT

This Item will be measured by the foot or by the square yard to the face of the curb.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Median" or "Concrete Directional Island." This price is full compensation for preparing foundation surfaces; furnishing and operating equipment; curbs and gutters used as part of the concrete median or directional island; and labor, materials, tools, and incidentals.

Item 540

Metal Beam Guard Fence

1. DESCRIPTION

Furnish, install, replace, or adjust metal beam guard fence consisting of metal beam rail elements, hardware, blocks, and support posts.

2. MATERIALS

Provide samples of metal beam rail elements, terminal sections, bolts, and nuts for compliance testing according to [Tex-708-I](#) and [Tex-713-I](#) to verify physical and chemical properties meet AASHTO M 180 when directed.

Obtain materials at the locations shown on the plans when the plans designate that the Department will furnish materials.

- 1.1 **Metal Beam Rail Elements.** Furnish new metal beam rail elements, transitions, anchor sections, and terminals that meet the requirements of Table 1 and are from a manufacturer on the Department's MPL of rail element manufacturers.

Type I or II is required, unless otherwise shown on the plans. Base metal for metal beam rail elements must not contain more than 0.04% phosphorous or more than 0.05% sulfur.

Warped or deformed rail elements will be rejected.

Table 1
Rail Element Requirements

Specification	AASHTO M 180
Class	A— Base metal nominal thickness 0.105 in. B— Base metal nominal thickness 0.135 in.
Type	I— Zinc-coated 1.80 oz. per square foot minimum single-spot. II— Zinc-coated 3.60 oz. per square foot minimum single-spot. IV— Weathering Steel (required when shown on the plans).
Shape	W-Beam Thrie Beam W-Beam to Thrie Beam Transition
Markings	Permanently mark each metal beam rail element with the information required in AASHTO M 180. In addition, permanently mark all curved sections of metal beam rail element with the radius of the curved section in the format "R=XX ft." Markings must be on the back of the metal beam rail section away from traffic and visible after erection.

- 1.2 **Posts.** Furnish new round timber, rectangular timber, or rolled steel section posts in accordance with details shown on the plans and the following requirements:

- 1.2.1 **Timber Posts.** Meet the requirements of [DMS-7200](#), "Timber Posts and Blocks for Metal Beam Guard Fence." Purchase from a manufacturer or supplier on the Department's MPL of timber treating plants and suppliers.

- 1.2.2 **Steel Posts.** Provide rolled sections conforming to the material requirements of ASTM A36. Drill or punch posts for standard rail attachment as shown on the plans. Galvanize according to Item 445, "Galvanizing." Low-fill culvert posts may be fabricated as galvanized "blanks" with the rail hole and the final height field fabricated. Treat all exposed post surfaces caused by the field fabrication in accordance with Section 445.3.5., "Repairs."

- 1.3 **Blocks.** Furnish new rectangular timber or composite blocks in accordance with details shown on the plans and the following requirements:
- 1.3.1 **Timber.** Meet the requirements of [DMS-7200](#), "Timber Posts and Blocks for Metal Beam Guard Fence." Purchase from a manufacturer or supplier on the Department's MPL of timber treating plants and suppliers.
- 1.3.2 **Composite.** Meet the requirements of [DMS-7210](#), "Composite Material Posts and Blocks for Metal Beam Guard Fence." Purchase from a manufacturer on the Department's MPL of composite material blocks and posts.
- 1.4 **Fittings.** Furnish new fittings (bolts, nuts, and washers) according to the details shown on the plans and galvanized according to Item 445, "Galvanizing."
- 1.5 **Terminal Connectors.** Furnish new terminal connectors, where required, meeting the material and galvanizing requirements specified for metal beam rail elements.
- 1.6 **Concrete.** Furnish concrete for terminal anchor posts meeting the requirements for Class A concrete as required in Item 421, "Hydraulic Cement Concrete."
- 1.7 **Curb.** If indicated in the details, furnish the curb shown with metal beam guard fence transition as required by Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- 1.8 **Terminal Anchor Posts.** Furnish new terminal anchor posts from steel conforming to the material requirements of ASTM A36. Fabricate posts according to Item 441, "Steel Structures." Galvanize terminal anchor posts after fabrication according to Item 445, "Galvanizing."
- 1.9 **Driveway Terminal Anchor Posts.** Furnish new terminal anchor posts from steel conforming to the material requirements of ASTM A36. Fabricate posts according to Item 441, "Steel Structures." Galvanize terminal anchor posts after fabrication according to Item 445, "Galvanizing."
- 1.10 **Downstream Anchor Posts.** Furnish new terminal anchor posts consisting of new rectangular timber and new steel foundation tubes according to details shown on the plans.
- 1.11 **Downstream Anchor Hardware.** Furnish new hardware (brackets, plates, struts, cable, etc.) according to the details shown on the plans and galvanized according to Item 445, "Galvanizing."
- 1.12 **Controlled Released Terminal (CRT) Posts.** Furnish new CRT posts according to the details shown on the plans and conforming to the requirements of [DMS-7200](#), "Timber Posts and Blocks for Metal Beam Guard Fence." Purchase from a manufacturer or supplier on the Department's MPL of timber treating plants and suppliers.

3. CONSTRUCTION

Install posts and rail elements according to details shown on the plans.

- 3.1 **Posts.** Install posts by either drilling or driving.
- 3.1.1 **Drilling.** Drill holes and set posts plumb and firm to the line and grade shown. Backfill posts by thoroughly compacting material to the density of adjacent undisturbed material.
- 3.1.2 **Driving.** Drive posts plumb with approved power hammers (steam, compressed air, vibratory, or diesel) or gravity hammers to the line and grade shown while preventing damage to the post. Use pilot holes when required and approved. Determine the size and depth of pilot holes based on results of the first few posts driven. Thoroughly tamp loosened soil around the post, fill voids with suitable material, and thoroughly compact to the density of adjacent undisturbed material.

- 3.2 **Rail Elements.** Erect metal beam rail elements to produce a smooth, continuous rail paralleling the line and grade of the roadway surface or as shown on the plans. Bolt rail elements end-to-end and lap splices in the direction of traffic. Field-drill or punch holes in rail elements for special details, only when approved.
- 3.3 **Short Radius.** Special rail fabrication with a required radius must be as shown on the plans.
- 3.4 **Terminal Anchor Posts.** Embed terminal anchor posts in concrete, unless otherwise shown on the plans.
- 3.5 **Galvanizing Repair.** Repair all parts of galvanized steel posts, washers, bolts, and rail elements after erection where galvanizing has become scratched, chipped, or otherwise damaged. Repair in accordance with Section 445.3.5., "Repairs."
- 3.6 **Guardrail Adjustment.** Work includes vertical adjustment, horizontal shift, and overlap of the rail element to meet the detail shown on the plans.
- 3.7 **Curb.** If indicated in the details, construct the curb shown with metal beam guard fence transition as required by Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- 3.8 **Driveway Terminal Anchor Posts.** Embed terminal anchor posts in concrete, unless otherwise shown on the plans.

4. MEASUREMENT

- 4.1 **Guard Fence.** Measurement will be by the foot of fence. Fence will be measured on the face of the rail in place, from center-to-center of end splice locations.
- 4.2 **Terminal Anchor Sections.** Measurement will be by each section, complete in place, consisting of a terminal anchor post and one 25-ft. section of rail element.
- 4.3 **Transitions.** Transitions for rail connection will be measured by each transition.
- 4.4 **Short Radius.** Measurement will be by the foot to the nearest whole foot along the face of the rail in place, from beginning of radius (first CRT post) to the end of radius.
- 4.5 **Driveway Terminal Anchor Section.** Measurement will be by each section, complete in place, consisting of a driveway terminal anchor post and one 6-ft. section of rail element.
- 4.6 **Downstream Anchor Terminal.** Measurement will be by each section, complete in place, consisting of one W-Beam end section, 2 downstream anchor posts, and one rail section.
- 4.7 **Long Span System.** Measurement will be by the foot of fence. Fence will be measured on the face of the rail, in place, between the first CRT and last CRT posts in the system.

5. PAYMENT

The work performed and material furnished in accordance with this Item and measured as provided under "Measurement" will be paid at the unit price bid for "Metal W-Beam Guard Fence" of the post type specified; "Metal Thrie Beam Guard Fence" of the post type specified; "Terminal Anchor Section"; "Metal Beam Guard Fence Transition" of the type specified; "Metal W-Beam Guard Fence Adjustment"; "Metal Thrie Beam Guard Fence Adjustment"; "Terminal Anchor Section Adjustment"; "Transition Adjustment"; "Short Radius"; "Driveway Terminal Anchor Section"; "Downstream Anchor Terminal"; or "Metal Beam Guard Fence (Long Span System)". "When weathering steel is required, Type IV will be specified.

Samples furnished to the Department for testing purposes, special backfill materials, and concrete curbs will not be paid directly but are subsidiary to this Item.

- 5.1 **Guard Fence.** The price bid for “Metal W-Beam Guard Fence” or “Metal Thrie Beam Guard Fence” is full compensation for materials, hauling, erection, setting posts in concrete, blocks, driving posts, excavating, backfilling, equipment, labor, tools, and incidentals.
- 5.2 **Terminal Anchor Section.** When a separate bid item is specified, the price bid for “Terminal Anchor Section” is full compensation for furnishing the rail element, anchor assembly, terminal anchor post, and foundations; installing the rail element anchor assembly and the terminal anchor post and foundations; excavation and backfilling; and equipment, labor, tools, and incidentals.
- 5.3 **Transition.** The price bid for “Metal Beam Guard Fence Transition” is full compensation for furnishing nested sections of Thrie Beam; nested sections of W-Beam; Thrie Beam to W-Beam transitional rail piece, posts, concrete, curb, and connections to W-Beam guard fence and bridge rails; Thrie Beam terminal connectors; excavation and backfilling; and equipment, labor, tools, and incidentals.
- 5.4 **Guardrail Adjustment.** The price bid for “Metal W-Beam Guard Fence Adjustment,” “Metal Thrie Beam Guard Fence Adjustment,” “Terminal Anchor Section Adjustment,” and “Transition Adjustment” is full compensation for furnishing materials not supplied by the Department, drilling holes in posts, hauling, erection, blocks, excavation, backfill, cleaning, salvaging materials, setting rail element anchor assembly and terminal anchor post, removal of rail element, concrete, curb, equipment, labor, tools, and incidentals.
- 5.5 **Short Radius.** The price bid for “Short Radius” is full compensation for furnishing special rail fabricated metal beam guard fence, CRT posts, steel posts, sand barrels, end terminal, cable anchor, materials, hauling, erection, blocks, driving posts, excavating, backfilling, equipment, labor, tools, and incidentals.
- 5.6 **Driveway Terminal Anchor Section.** The price bid for “Driveway Terminal Anchor Section” is full compensation for furnishing the rail element, driveway anchor assembly, driveway terminal anchor post, and foundations; installing the rail element anchor assembly and the driveway terminal anchor post and foundations; excavation and backfilling; and equipment, labor, tools, and incidentals.
- 5.7 **Downstream Anchor Terminal.** The price bid for “Downstream Anchor Terminal” is full compensation for furnishing the rail element, W-Beam end section, guardrail anchor bracket, shelf angle bracket, channel strut, downstream anchor posts, breakaway cable terminal (BCT) cable anchor assembly, and foundations; installing the BCT cable anchor assembly and the downstream anchor post and foundations; excavation and backfilling; and equipment, labor, tools, and incidentals.
- 5.8 **Long Span System.** The price bid for “Metal Beam Guard Fence (Long Span System)” is full compensation for furnishing the rail element, CRT posts, materials, hauling, erection, blocks, driving posts, excavating, backfilling, equipment, labor, tools, and incidentals.

Item 636

Signs

1. DESCRIPTION

- **Installation.** Furnish, fabricate, and erect aluminum signs. Sign supports are provided for under other Items.
- **Replacement.** Replace existing signs on existing sign supports.
- **Refurbishing.** Refurbish existing aluminum signs on existing sign supports.

2. MATERIALS

- 2.1 **Sign Blanks.** Furnish sign blank substrates in accordance with [DMS-7110](#), "Aluminum Sign Blanks," and in accordance with the types shown on the plans. Use single-piece sheet-aluminum substrates for Type A (small) signs and extruded aluminum substrates for Type G (ground-mounted) or Type O (overhead-mounted) signs.
- 2.2 **Sign Face Retroreflectorization.** Retroreflectorize the sign faces with flat surface reflective sheeting. Furnish sheeting that meets [DMS-8300](#), "Sign Face Materials." Use retroreflective sheeting from the same manufacturer for the entire sign face background. Ensure that sign legend, symbols, borders, and background exhibit uniform color, appearance, and retroreflectivity when viewed both day and night.
- 2.3 **Sign Messages.** Fabricate sign messages to the sizes, types, and colors shown on the plans. Use sign message material from the same manufacturer for the entire message of a sign. Use screen ink and background reflective sheeting that are from the same manufacturer when fabricating signs.
- Ensure that the screened messages have clean, sharp edges and exhibit uniform color and retroreflectivity. Prevent runs, sags, and voids. Furnish screen inks in accordance with [DMS-8300](#), "Sign Face Materials."
 - Fabricate colored, transparent film legend, and retroreflectorized sheeting legend from materials that meet [DMS-8300](#), "Sign Face Materials."
 - Fabricate non-reflective black film legend from materials meeting [DMS-8300](#), "Sign Face Materials."
 - Furnish direct-applied route markers and other attachments within the parent sign face unless otherwise specified on the plans.
- 2.4 **Hardware.** Use galvanized steel, stainless steel, or dichromate-sealed aluminum for bolts, nuts, washers, lock washers, screws, and other sign assembly hardware. Use plastic or nylon washers to avoid tearing the reflective sheeting. Furnish steel or aluminum products in accordance with [DMS-7120](#), "Sign Hardware."

When dissimilar metals are used, select or insulate metals to prevent corrosion.

3. CONSTRUCTION

- 3.1. **Fabrication.** Sign fabrication plants that produce permanent highway signs must be approved in accordance with DMS-7390, "Permanent Highway Sign Fabrication Plant Qualification." Furnish signs from prequalified fabrication plants listed in the Department's MPL.

- 3.1.1. **Sign Blanks.** Furnish sign blanks to the sizes and shapes shown on the plans and that are free of buckles, warps, burrs, dents, cockles, or other defects. Do not splice individual extruded aluminum panels.
- Complete the fabrication of sign blanks, including the cutting and drilling or punching of holes, before cleaning and degreasing. After cleaning and degreasing, ensure the substrate does not come into contact with grease, oils, or other contaminants before the application of the reflective sheeting.
- 3.1.2 **Sheeting Application.** Apply sheeting to sign blanks in conformance with the sheeting manufacturer's recommended procedures.
- When using rotational sensitive white sheeting, fabricate signs by applying the sheeting for cut-out legend, symbols, borders, and route marker attachments within the parent sign face with the identification marks or other orientation features in the optimum rotation as identified by the sheeting manufacturer.
- Clean and prepare the outside surface of extruded aluminum flanges in the same manner as the sign panel face.
- Minimize the number of splices in the sheeting. Overlap the lap-splices by at least 1/4 in. for encapsulated glass bead sheeting unless otherwise recommended by the reflective sheeting manufacturer. Use butt splices for prismatic reflective sheeting. Provide a 1 ft. minimum dimension for any piece of sheeting. Do not splice sheeting for signs fabricated with transparent screen inks or colored transparent films.
- 3.1.3 **Sign Assembly.** Assemble extruded aluminum signs in accordance with the details shown on the plans. Sign face surface variation must not exceed 1/8 in. per foot. Surface misalignment between panels in multi-panel signs must not exceed 1/16 in. at any point.
- 3.1.4 **Decals.** Code and apply sign identification decals in accordance with Item 643, "Sign Identification Decals."
- 3.2. **Storage and Handling.** Ship, handle, and store completed sign blanks and completed signs so that corners, edges, and faces are not damaged. Damage to the sign face that is not visible when viewed at a distance of 50 ft., night or day, will be acceptable. Replace unacceptable signs.
- Store all finished signs off the ground and in a vertical position until erected. Store finished sheet aluminum substrate signs in a weatherproof building. Extruded aluminum substrate signs may be stored outside.
- Stockpile salvageable materials at the location shown on the plans or as directed. Accept ownership of unsalvageable materials and dispose of them in accordance with federal, state, and local regulations.
- 3.3 **Cleaning.** Wash completed signs in the fabrication shop with a biodegradable cleaning solution acceptable to the manufacturers of the sheeting, colored transparent film, and screen ink to remove grease, oil, dirt, smears, streaks, finger marks, and other foreign material. Wash again before final inspection after erection.
- 3.4 **Installation.** Install signs as shown on the plans or as directed.
- 3.5 **Replacement.** Remove the existing signs from the existing supports and replace with new signs, including mounting hardware, as shown on the plans.
- 3.6 **Refurbishing.** Refurbish existing signs by providing and installing new messages and mounting hardware. Install new retroreflectorized legend and supplemental signs as shown on the plans.

- 3.7 **Documentation.** Provide the following documentation from the sign fabricator with each shipment of furnished signs:
- A notarized original of the Signing Material Statement (Form 2273) with the proper attachments for verification of compliance, and
 - A notarized certification stating that the completed signs were fabricated in accordance with this Item and the plans.

4. MEASUREMENT

Signs installed or replaced will be measured by the square foot of the sign face. Signs refurbished will be measured by each sign.

This is a plans quantity measurement item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

5. PAYMENT

The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Aluminum Signs," "Replacing Existing Aluminum Signs," or "Refurbishing Aluminum Signs," of the type specified.

- 5.1 **Installation.** This price is full compensation for furnishing and installing new signs and hardware; fabrication of sign panels; treatment of sign panels required before application of the background materials; application of the background materials and messages to the sign panels; furnishing and fabricating frames, wind beams and stiffeners; furnishing bolts, rivets, screws, fasteners, clamps, brackets, and sign support connections; assembling and erecting the signs; preparing and cleaning the signs; and materials, equipment, labor, tools, and incidentals.
- 5.2 **Replacement.** This price is full compensation for furnishing and installing new aluminum signs and hardware; removal of existing signs; fabrication of sign panels; treatment of sign panels required before application of the background materials; application of the background materials and messages to the sign panels; furnishing and fabricating frames, wind beams and stiffeners; furnishing bolts, rivets, screws, fasteners, clamps, brackets, and sign support connections; assembling and erecting the signs; preparing and cleaning the signs; salvaging and disposing of unsalvageable materials; and materials, equipment, labor, tools, and incidentals.
- 5.3 **Refurbishing.** This price is full compensation for modifying existing sign messages; removing and replacing existing route markers, reflectorized legend, or supplemental signs attached to the parent sign; preparing and cleaning the signs; furnishing sheeting and hardware; salvaging and disposing of unsalvageable materials; and materials, equipment, labor, tools, and incidentals.

Item 666

Retroreflectorized Pavement Markings

1. DESCRIPTION

Furnish and place retroreflectorized, non-retroreflectorized (shadow) and profile pavement markings.

2. MATERIALS

2.1. **Type I Marking Materials.** Furnish in accordance with [DMS-8220](#), "Hot Applied Thermoplastic."

Furnish pavement marking material used for Type I profile markings and shadow markings that have been approved by the Construction Division, and in accordance with [DMS-8220](#), "Hot Applied Thermoplastic."

2.2. **Type II Marking Materials.** Furnish in accordance with [DMS-8200](#), "Traffic Paint."

2.3. **Glass Traffic Beads.** Furnish drop-on glass beads in accordance with [DMS-8290](#), "Glass Traffic Beads" or as approved. Furnish a double-drop of Type II and Type III drop-on glass beads where each type bead is applied separately in equal portions (by weight), unless otherwise approved. Apply the Type III beads before applying the Type II beads.

2.4. **Labeling.** Use clearly marked containers that indicate color, mass, material type, manufacturer, and batch number.

3. EQUIPMENT

3.1 **General Requirements.** Use equipment that:

- is maintained in satisfactory condition,
- meets or exceeds the requirements of the National Board of Fire Underwriters and the Texas Railroad Commission for this application,
- applies beads by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads are dispensed uniformly and almost instantly upon the marking as the marking is being applied to the road surface. The bead dispenser must have an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment,
- has an automatic cut-off device with manual operating capabilities to provide clean, square marking ends,
- is capable of producing the types and shapes of profiles specified, and
- can provide continuous mixing and agitation of the pavement marking material. The use of pans, aprons, or similar appliances which the die overruns will not be permitted for longitudinal striping applications.

Provide a hand-held thermometer capable of measuring the temperature of the marking material when applying Type I material.

When pavement markings are required to meet minimum retroreflectivity requirements on the plans:

- Use a mobile retroreflectometer approved by the Construction Division and certified by the Texas A&M Transportation Institute Mobile Retroreflectometer Certification Program.
- Use a portable retroreflectometer that:
 - uses 30-meter geometry and meets the requirements described in ASTM E1710;

- has either an internal global positioning system (GPS) or the ability to be linked with an external GPS with a minimum accuracy rating of 16 ft. 5 in., in accordance with the circular error probability (CEP) method (CEP is the radius of the circle with its origin at a known position that encompasses 50% of the readings returned from the GPS instrument);
- can record and print the GPS location and retroreflectivity reading for each location where readings are taken.

3.2

Material Placement Requirements. Use equipment that can place:

- at least 40,000 ft. of 4-in. solid or broken non-profile markings per working day at the specified thickness;
- at least 15,000 ft. of solid or broken profile pavement markings per working day at the specified thickness;
- linear non-profile markings up to 8 in. wide in a single pass;
- non-profile pavement markings other than solid or broken lines at an approved production rate;
- a centerline and no-passing barrier-line configuration consisting of 1 broken line and 2 solid lines at the same time to the alignment, spacing, and thickness for non-profile pavement markings shown on the plans;
- solid and broken lines simultaneously;
- white line from both sides;
- lines with clean edges, uniform cross-section with a tolerance of $\pm 1/8$ in. per 4 in. width, uniform thickness, and reasonably square ends;
- skip lines between 10 and 10-1/2 ft., a stripe-to-gap ratio of 10 to 30, and a stripe-gap cycle between 39-1/2 ft. and 40-1/2 ft., automatically;
- beads uniformly and almost instantly on the marking as the marking is being applied;
- beads uniformly during the application of all lines (each line must have an equivalent bead yield rate and embedment); and
- double-drop bead applications using both Type II and Type III beads from separate independent bead applicators, unless otherwise approved by the Engineer.

4. CONSTRUCTION

Place markings before opening to traffic unless short-term or work zone markings are allowed.

4.1

General. Obtain approval for the sequence of work and estimated daily production. Minimize interference to roadway operations when placing markings on roadways open to traffic. Use traffic control as shown on the plans or as approved. Protect all markings placed under open-traffic conditions from traffic damage and disfigurement.

Establish guides to mark the lateral location of pavement markings as shown on the plans or as directed, and have guide locations verified. Use material for guides that will not leave a permanent mark on the roadway.

Apply markings on pavement that is completely dry and passes the following tests:

- **Type I Marking Application**—Place a sample of Type I marking material on a piece of tarpaper placed on the pavement. Allow the material to cool to ambient temperature, and then inspect the underside of the tarpaper in contact with the pavement. Pavement will be considered dry if there is no condensation on the tarpaper.
- **Type II Marking Application**—Place a 1-sq. ft. piece of clear plastic on the pavement, and weight down the edges. The pavement is considered dry if, when inspected after 15 min., no condensation has occurred on the underside of the plastic.

Apply markings:

- that meet the requirements of [Tex-828-B](#),
- that meet minimum retroreflectivity requirements when specified on the plans (applies to Type I markings only),
- using widths and colors shown on the plans,
- at locations shown on the plans,
- in proper alignment with the guides without deviating from the alignment more than 1 in. per 200 ft. of roadway or more than 2 in. maximum,
- without abrupt deviations,
- free of blisters and with no more than 5% by area of holes or voids,
- with uniform cross-section, density and thickness,
- with clean and reasonably square ends,
- that are retroreflectorized with drop-on glass beads, and
- using personnel skilled and experienced with installation of pavement markings.

Remove all applied markings that are not in alignment or sequence as stated on the plans, or in the specifications, at the Contractor's expense in accordance with Item 677, "Eliminating Existing Pavement Markings and Markers," except for measurement and payment.

- 4.2 **Surface Preparation.** Prepare surfaces in accordance with this Section unless otherwise shown on the plans.
- 4.2.1 **Cleaning for New Asphalt Surfaces and Retracing of All Surfaces.** Air blast or broom the pavement surface for new asphalt surfaces (less than 3 years old) and for retracing of all surfaces to remove loose material, unless otherwise shown on the plans. A sealer for Type I markings is not required unless otherwise shown on the plans.
- 4.2.2 **Cleaning for Old Asphalt and Concrete Surfaces (Excludes Retracing).** Clean old asphalt surfaces (more than 3 years old) and all concrete surfaces in accordance with Item 678, "Pavement Surface Preparation for Markings," to remove curing membrane, dirt, grease, loose and flaking existing construction markings, and other forms of contamination.
- 4.2.3 **Sealer for Type I Markings.** Apply a pavement sealer to old asphalt surfaces (more than 3 years old) and to all concrete surfaces before placing Type I markings on locations that do not have existing markings, unless otherwise approved. The pavement sealer may be either a Type II marking or an acrylic or epoxy sealer as recommended by the Type I marking manufacturer unless otherwise shown on the plans. Follow the manufacturer's directions for application of acrylic or epoxy sealers. Clean sealer that becomes dirty after placement by washing or in accordance with Section 666.4.2.1., "Cleaning for New Asphalt Surfaces and Retracing of All Surfaces," as directed. Place the sealer in the same configuration and color (unless clear) as the Type I markings unless otherwise shown on the plans.
- 4.3 **Application.** Apply markings during good weather unless otherwise directed. If markings are placed at Contractor option when inclement weather is impending and the markings are damaged by subsequent precipitation, the Contractor is responsible for all required replacement costs.
- 4.3.1 **Type I Markings.** Place the Type I marking after the sealer cures. Apply within the temperature limits recommended by the material manufacturer. Flush the spray head if spray application operations cease for 5 min or longer by spraying marking material into a pan or similar container until the material being applied is at the recommended temperature.
- Apply on clean, dry pavements passing the moisture test described in Section 666.4.1., "General," and with a surface temperature above 50°F when measured in accordance with [Tex-829-B](#).
- 4.3.1.1 **Non-Profile Pavement Markings.** Apply Type I non-profile markings with a minimum thickness of:
- 0.100 in. (100 mils) for new markings and retracing water-based markings on surface treatments involving Item 316, "Seal Coat,"
 - 0.060 in. (60 mils) for retracing on thermoplastic pavement markings, or

- 0.090 in. (90 mils) for all other Type I markings.

The maximum thickness for Type I non-profile markings is 0.180 in. (180 mils). Measure thickness for markings in accordance with [Tex-854-B](#) using the tape method.

4.3.1.2 **Profile Pavement Markings.** Apply Type I profile markings with a minimum thickness of:

- 0.060 in. (60 mil) for edgeline markings, or
- 0.090 in. (90 mil) for gore and centerline/no-passing barrier line markings.

In addition, at a longitudinal spacing indicated on the plans, the markings must be profiled in a vertical manner such that the profile is transverse to the longitudinal marking direction. The profile must not be less than 0.30 in. (300 mil) nor greater than 0.50 in. (500 mil) in height when measured above the normal top surface plane of the roadway. The transverse width of the profile must not be less than 3.25 in., and the longitudinal width not less than 1 in., when measured at the top surface plane of the profile bar. The profile may be either a 1 or 2 transverse bar profile. When the 2 transverse bar profile is used, the spacing between the bases of the profile bars must not exceed 0.50 in. The above transverse bar width is for each 4 in. of line width.

4.3.2 **Type II Markings.** Apply on surfaces with a minimum surface temperature of 50°F. Apply at least 20 gal. per mile on concrete and asphalt surfaces and at least 22 gal. per mile on surface treatments for a solid 4-in. line. Adjust application rates proportionally for other widths. When Type II markings are used as a sealer for Type I markings, apply at least 15 gal. per mile using Type II drop-on beads.

4.3.3 **Bead Coverage.** Provide a uniform distribution of beads across the surface of the stripe for Type I and Type II markings, with 40% to 60% bead embedment.

4.4 **Retroreflectivity Requirements.** When specified on the plans, Type I markings must meet the following minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application:

- White markings: 250 millicandelas per square meter per lux (mcd/m²/lx)
- Yellow markings: 175 mcd/m²/lx

4.5 **Retroreflectivity Measurements.** Use a mobile retroreflectometer for projects requiring minimum retroreflectivity requirements to measure retroreflectivity for Contracts totaling more than 200,000 ft. of pavement markings, unless otherwise shown on the plans. For Contracts with less than 200,000 ft. of pavement markings or Contracts with callout work, mobile or portable retroreflectometers may be used at the Contractor's discretion.

4.5.1 **Mobile Retroreflectometer Measurements.** Provide mobile measurements averages for every 0.1 miles unless otherwise specified or approved. Take measurements on each section of roadway for each series of markings (i.e., edgeline, center skip line, each line of a double line, etc.) and for each direction of traffic flow. Measure each line in both directions for centerlines on two-way roadways (i.e., measure both double solid lines in both directions and measure all center skip lines in both directions). Furnish measurements in compliance with Special Specification, "Mobile Retroreflectivity Data Collection for Pavement Markings," unless otherwise approved. The Engineer may require an occasional field comparison check with a portable retroreflectometer meeting the requirements listed above to ensure accuracy. Use all equipment in accordance with the manufacturer's recommendations and directions. Inform the Engineer at least 24 hr. before taking any measurements.

A marking meets the retroreflectivity requirements if:

- the combined average retroreflectivity measurement for a one-mile segment meets the minimum retroreflectivity values specified, and
- no more than 30% of the retroreflectivity measurement values are below the minimum retroreflectivity requirements value within the one-mile segment.

The Engineer may accept failing one-mile segments if no more than 20% of the retroreflectivity measurements within that mile segment are below the minimum retroreflectivity requirement value.

The one-mile segment will start from the beginning of the data collection and end after a mile worth of measurements have been taken; each subsequent mile of measurements will be a new segment. Centerlines with 2 stripes (either solid or broken) will result in 2 miles of data for each mile segment. Each centerline stripe must be tested for compliance as a stand-alone stripe.

Restripe at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking if the marking fails retroreflectivity requirements. Take measurements every 0.1 miles a minimum of 10 days after this second application within that mile segment for that series of markings.

If the markings do not meet minimum retroreflectivity after 10 days of this second application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

- 4.5.2 **Portable Retroreflectometer Measurements.** Take a minimum of 20 measurements for each 1-mi. section of roadway for each series of markings (i.e., edgeline, center skip line, each line of a double line, etc.) and direction of traffic flow when using a portable reflectometer. Measure each line in both directions for centerlines on two-way roadways (i.e., measure both double solid lines in both directions and measure all center skip lines in both directions). The spacing between each measurement must be at least 100 ft. The Engineer may decrease the mileage frequency for measurements if the previous measurements provide satisfactory results. The Engineer may require the original number of measurements if concerns arise.

Restripe once at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements fails. Take a minimum of 10 more measurements after 10 days of this second application within that mile segment for that series of markings. Restripe again at the Contractor's expense with a minimum of 0.060 in. (60 mils) of Type I marking material if the average of these measurements fall below the minimum retroreflectivity requirements. If the markings do not meet minimum retroreflectivity after this third application, the Engineer may require removal of all existing markings, a new application as initially specified, and a repeat of the application process until minimum retroreflectivity requirements are met.

- 4.5.3 **Traffic Control.** Provide traffic control, as required, when taking retroreflectivity measurements after marking application. On low volume roadways (as defined on the plans), refer to the figure, "Temporary Road Closure" in Part 6 of the *Texas Manual on Uniform Traffic Control Devices* for the minimum traffic control requirements. For all other roadways, the minimum traffic control requirements will be as shown on the Traffic Control Plan (TCP) standard sheets TCP (3-1) and TCP (3-2). The lead vehicle will not be required on divided highways. The TCP and traffic control devices must meet the requirements listed in Item 502, "Barricades, Signs, and Traffic Handling." Time restrictions that apply during striping application will also apply during the retroreflectivity inspections except when using the mobile retroreflectometer unless otherwise shown on the plans or approved.

- 4.6. **Performance Period.** All markings must meet the requirements of this specification for at least 30 calendar days after installation. Unless otherwise directed, remove pavement markings that fail to meet requirements, and replace at the Contractor's expense. Replace failing markings within 30 days of notification. All replacement markings must also meet all requirements of this Item for a minimum of 30 calendar days after installation.

5. MEASUREMENT

This Item will be measured by the foot; by each word, symbol, or shape; or by any other unit shown on the plans. Each stripe will be measured separately.

This is a plans quantity measurement item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2., "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

Acrylic or epoxy sealer, or Type II markings when used as a sealer for Type I markings, will be measured by the foot; by each word, symbol, or shape; or by any other unit shown on the plans.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Pavement Sealer" of the size specified, "Retroreflectorized Pavement Markings" of the type and color specified and the shape, width, size, and thickness specified as applicable, "Retroreflectorized Pavement Markings with Retroreflective Requirements" of the types, colors, sizes, widths, and thicknesses specified or "Retroreflectorized Profile Pavement Markings" of the various types, colors, shapes, sizes, and widths specified.

This price is full compensation for application of pavement markings, materials, equipment, labor, tools, and incidentals.

Surface preparation of new concrete and asphalt concrete pavements more than 3 years old, where no stripe exists, will be paid for under Item 678, "Pavement Surface Preparation for Markings." Surface preparation of all other asphalt and old concrete pavement, except for sealing, will not be paid for directly but is subsidiary to this Item.

Work zone pavement markings (Type II, paint and beads) used as a sealer for Type I markings (thermoplastic) will be paid for under Item 662, "Work Zone Pavement Markings."

If the Engineer requires that markings be placed in inclement weather, repair or replacement of markings damaged by the inclement weather will be paid for in addition to the original plans quantity.

Special Specification 7017

Sanitary Sewers

1. DESCRIPTION

Furnish labor, materials, and equipment necessary to provide a complete sanitary sewer system in accordance and compliance with ANSI, AWWA, ASTM, ASA, SSPC, ACI, and NSF standards, the plans and specifications, and in compliance with the Department's Utility Accommodation Policy (Title 43, T.A.C., Sections 21.31-21.55).

The abbreviations ANSI, AWWA, ASTM, ASA, SSPC, ACI, and NSF in this specification refer to the following organizations:

- ANSI American National Standards Institute
- AWWA American Water Works Association
- ASTM American Society for Testing and Materials
- ASA American Standards Association
- SSPC Steel Structures Painting Council
- ACI American Concrete Institute
- NSF National Sanitation Foundation

When referring to the specifications of the above organizations, it means the latest standard or tentative standard in effect on the date of the proposal.

The size and location of utility lines shown on the plans were obtained from field surveys and from the various utility companies. The Department does not assume responsibility for the accuracy of the information presented, nor does it warrant that every utility line is shown.

2. MATERIALS

Furnish new and unused materials for this project unless otherwise specified on the plans. Provide a manufacturer's certificate of compliance for quality control of materials unless otherwise shown on the plans, except for the inspection requirements of Item 464, "Reinforced Concrete Pipe."

- 2.1 **Circular Concrete Pipe.** Provide circular concrete pipe 36 in. in diameter and greater conforming to the class specified on the plans and in accordance with Item 464, "Reinforced Concrete Pipe." Circular concrete pipe less than 36 in. in diameter is not allowed. Furnish polyvinyl chloride (PVC)-lined concrete pipe interiors for corrosion protection. See Section 2.9., "Plastic Liner for Concrete Pipes," of this specification.

Upon delivery to the trenches, the pipe and specials will be inspected for transportation and handling damages incurred after acceptance at the source of manufacture. Repair the pipe if necessary. If, in the opinion of the Engineer, the repairs are sound, properly finished and cured, and the repaired pipe conforms to the requirements of these specifications, it will be acceptable.

Unless otherwise specified on the plans, for concrete pipe, use corrosion-resistant rubber gasket joints of the "push on" type, and that meet the requirements of ASTM C443.

- 2.2 **Polyvinyl Chloride (PVC) Pipe and Fittings.**

For PVC pipe, use steel casing meeting the requirements of Section 2.8, "Steel Casing Pipe," of this specification.

Use lubricant for assembly that has no detrimental effects to the gasket or pipe and is of the type recommended by the pipe manufacturer.

Furnish a manufacturer's certification that the pipe and fittings being furnished on the project meet the requirements of this specification. Ensure written approval from the Engineer in charge accompanies this certification to the project site, before installing the pipe and fittings.

Provide pipe and fittings that are free from defects which, in the judgment of the Engineer, would hinder their ability to function as planned.

- 2.2.1. **Gravity Sewer.** Provide plastic pipe and fittings meeting the requirements of ASTM D3034 SDR35, D2241 or D3034 SDR26, F679 SDR35, or F794 teel Carrier Pipe.
- 2.2.2. **Force Mains.** Provide PVC pipe for force mains meeting or exceeding the requirements of AWWA C-900/905. Use ductile-iron (Class 52) fittings for force main pipes.
- 2.2.3. **Water Main Crossings.** If constructing gravity or force main sewers in the vicinity of water mains, meet the requirements of the "Rules and Regulations for Public Water Systems" adopted in 1992 by the Texas Water Commission (now the Texas Commission on Environmental Quality).
- 2.3. **Ductile-Iron Pipe and Fittings.** Provide ductile-iron pipe that meets the requirements of ANSI A21.51 (AWWA C151) Class 53. Unless otherwise specified on the plans, determine the pipe thickness based on the depth of cover and an internal pressure of 150 psi. Furnish pipe in nominal 18 ft. or 20 ft. lengths.

Provide fittings for use with ductile-iron pipe that meet the requirements of ANSI Standard A21.10 (AWWA C110). Design the fittings for a minimum working pressure of 150 psi.

Provide joints for ductile-iron pipe of the type in accordance with the requirements of ANSI Standard A21.11 (AWWA C151) for push on or ANSI A21.15 for flanged end.
- 2.4. **Line Interiors.** Provide lined interiors meeting ANSI A21.4, cement lined with seal coat or ANSI A 21.16 fusion bonded epoxy coating for interior. Comply with NSF 61.
- 2.5. **Sanitary Sewer and Force Main Interiors**
 - 2.5.1. **Preparation.** Provide commercial blast cleaning conforming to SSPC-SP6.
 - 2.5.2. **Liner Thickness.** Provide a nominal liner thickness of 40 mils for the pipe barrel interior and a minimum of 6 to 10 mils at the gasket groove and outside spigot end to 6 in. back from the end.
 - 2.5.3. **Testing.** Perform testing in accordance with ASTM G 62, Method B for voids and holidays. Provide written certification.
 - 2.5.4. **Acceptable Lining Materials.** Provide approved virgin polyethylene conforming to ASTM D 1248, with inert fillers and carbon black to resist ultraviolet degradation during storage, heat bonded to the interior surface of pipe and fittings.
 - 2.5.4.1. **Ceramic Epoxy Protection.** For the exterior of sanitary sewers, furnish a prime coat and outside asphaltic coating conforming to ANSI A21.10, ANSI A21.15, or ANSI A21.51 for pipe and fittings in open cut excavation and in casings.
- 2.6. **Gaskets.** Furnish, when no contaminant is identified, plain rubber (SBR) gasket material in accordance with ANSI A21.11 or ASTM F 477 (one bolt only). For flanged joints, furnish a 1/8-in.-thick gasket in accordance with ANSI A 21.15.

2.7

Fiberglass Pipe and Fittings. Provide centrifugally cast fiberglass pipe in accordance with the requirements of ASTM D3262 and ASTM D3681. Ensure the actual outside diameter of the pipe is in accordance with Table 3 of ASTM D3754. The standard pipe length is approximately 20 ft. A maximum of 10% of the lengths, excluding special order pipes, may be supplied in random lengths.

Ensure the manufacturer uses only polyester resin systems with a proven history of performance in this particular application. Use only the historical data collected from applications of a composite material of similar construction and composition as the proposed product.

For the reinforcing glass fibers used to manufacture the components, use the highest quality commercial grade glass filaments with binder and sizing compatible with impregnating resins.

Silica sand or other suitable materials may be used for fillers.

If resin additives, such as pigments, dyes, and other coloring agents are used, ensure they are not detrimental to the performance of the pipe and they do not impair visual inspection of the finished product.

Provide gaskets supplied by approved gasket manufacturers, in accordance with ASTM 477, and that are suitable for the service intended.

Provide flanges, elbows, reducers, tees, and other fittings capable of withstanding operating conditions when installed. They may be contact-molded or manufactured from metered sections of pipe joined by glass fiber reinforced overlays.

Use a stiffness class of centrifugally cast fiberglass pipe that satisfies design requirements under ASTM D3262, but that is not less than 46 psi when used in direct-bury operation or 36 psi when installed in a tunnel liner.

Provide centrifugally cast fiberglass pipe with an internal liner resin suitable for service as sewer pipe and that is highly resistant to exposure to sulfuric acid in accordance with ASTM D3681.

Supply pipe manufactured by the centrifugal casting process. An acceptable manufacturer is Hobas Pipe, USA, Inc. or approved equal.

Provide a manufacturer's certification that the pipe and fittings furnished on the project meet the requirements of this specification. Written approval from the Engineer in charge must accompany this certification to the project site, before installing the pipe and fittings.

Furnish pipe and fittings that are free from defects which, in the judgment of the Engineer, would hinder their ability to function as planned.

2.8

Steel Casing Pipe. Provide minimum wall thicknesses in accordance with those shown in Table 1 for HS-20 live loads and depths of bury of up to 16 ft.

Supply the pipe in double random lengths, of at least 16 ft. and at most 40 ft., unless otherwise shown on the plans. Bevel the ends of the pipe for field butt welding. Provide welder qualification in accordance with A C206.

**Table 1
Casing Pipe**

Casing Pipe Size (in.)	Outside Diameter (in.)	Min. Wall Thickness (in.)	Approx. Weight Uncoated (lb./ft.)
6	6.625	0.219	14.97
8	8.625	0.219	19.64
10	10.750	0.219	24.60
12	12.750	0.219	29.28

14	14.000	0.219	32.00
16	16.000	0.219	36.86
20	20.000	0.250	52.73
24	24.000	0.250	63.41
30	30.000	0.250	79.43
36	36.000	0.250	95.45
42	42.000	0.250	111.50
Note: It is the design Engineer's responsibility to review the design for conditions more extreme than those indicated by this specification and to design accordingly. Do not use a thickness of the pipe wall less than that defined in Table 1.			

Furnish steel casing pipe coated with coal-tar enamel externally and with polyamide epoxy internally.

2.9

Plastic Liner for Concrete Pipes. Furnish plastic liner sheets, joint, corner, and weld strips, manufactured from a high molecular weight thermoplastic polymer compounded to make a permanently flexible material suitable for use as a protective liner in pipe or other structures. Ensure polyvinyl chloride resin constitutes a minimum of 99% by weight of the resin used in the formulation. Co-polymer resins are not permitted.

Any time during the manufacture or before the final acceptance of the work, the Engineer may sample specimens taken from sheets, strips, or welded joints for testing.

Changes in formulation will be permitted only after notifying the Engineer and after the manufacturer demonstrates that the new plastic liner meets or exceeds requirements for chemical resistance and physical properties.

Furnish the plastic liner as manufactured by Ameron T-Lok, Poly-Tee, Inc., or approved equal.

Provide plastic liner sheets including locking extensions, joints, corners, and welding strips, which are free of cracks, cleavages, or other defects adversely affecting the protective characteristics of the material.

Except at shop welds, ensure plastic liner sheets, joint, corner, and weld strips have the properties shown in Table 2 when tested at 77°F ± 5°F.

Table 2
Chemical Resistance Test

Property	Initial Result	After Exposure for 112 Days in Chemical Solutions
Tensile Strength, Min.	2200 psi	2100 psi
Elongation at Break, Min.	200%	200%
Shore Diameter, Type D	Within 1 sec. 50-60	±5 (With respect to initial test result)
	10 sec. 35-50	±5
Weight Change	--	± 1.5%

2.10

Liner for Ductile-Iron Pipe. Furnish pipe internally lined with ceramic epoxy Protecto 401 or virgin polyethylene in accordance with the requirements of ASTM D1248, compounded with inert fillers and carbon black to resist ultraviolet light degradation during storage.

Heat-bond the liner to the interior of the pipe and fittings over a blast cleaned surface as recommended by the manufacturer or SSPC-SP6.

Provide a nominal liner thickness of 40 to 50 mils with a minimum thickness of 35 mils and covering surfaces exposed to sanitary sewage.

Test for voids and holidays in accordance with ASTM G62, Method B and provide a manufacturer's certification.

Furnish Polyline liner pipe manufactured by U.S. Pipe and Foundry Company, Polybond by American Cast Iron Pipe Company, or an approved equal.

Apply a polyamide epoxy prime coat to the exterior and ensure the outside asphaltic coating is in accordance with ANSI A21.10, ANSI A21.15, ANSI A21.51, or AWWA C-218 for pipe and fittings in open cut excavation and in casings.

Use a polyurethane coating for the exterior conforming to the requirements of the approved manufacturer, CORROPIPE II – TX, Madison Chemical Industries, Inc., for polyurethane coatings on steel or ductile-iron pipe.

2.11. **Polyethylene Film Wrap.**

2.11.1. **General.** Except where noted on the plans, use polyethylene film or tape as a wrap to protect ductile-iron pipe and fittings only in open ditch placements. Use polyethylene film conforming to the requirements of this specification.

2.11.2. **Film.** For polyethylene film, use virgin polyethylene in accordance with ASTM D1248 and AWWA C105, Type I, Class C, Category 5, Grade E-5, 2.5 to 3.0% carbon black content. Unless otherwise specified on the plans, use film 8 mils thick and with a tensile strength of 1200 to 2500 psi with elongation up to 600%. Also, ensure the dielectric strength is 800 volts per mil of thickness. Furnish the film in either in tubular form or in sheet form. Furnish film supplied in tubular form in the minimum widths shown in Table 3.

Table 3
Minimum Width of Film Tube (when laying flat)

Nominal Pipe Size (in.)	Push-On Joint Flat Tube Width (in.)
4	20
6	20
8	24
10	27
12	30
14	34
16	37
18	41
20	45
24	54

Furnish film supplied in sheet form in a width equal to twice that shown for tube widths.

2.11.3 **Polyethylene Tape.** For the tape used to tape film edges and overlaps, use a 3-in. wide plastic backed adhesive tape. Use Paleocene No. 900, Scotch Wrap No. 50, or approved equal.

2.12. **Concrete.** Unless otherwise shown on the plans, for concrete other than materials for pipe, use Class "A" concrete in accordance with the materials requirements of Item 420, "Concrete Substructures," and Item 421, "Hydraulic Cement Concrete."

2.13. **Cement Stabilized Sand.** Use cement stabilized sand backfill containing a minimum of 7% cement, per cubic yard of material, based on the dry weight of the aggregate in accordance with Test Method TEX-120-E, of material as placed. The materials consist of aggregate, hydraulic cement, and water. Use cement and water in accordance with the materials requirements of Item 421, "Hydraulic Cement Concrete." Furnish sand, free from deleterious matter, with a maximum Plasticity Index of 6 when tested by Test Method TEX-106-E.

2.14. **Backfill and Bedding Materials.** Unless otherwise specified on the plans, furnish sand for bedding of the sanitary sewer that is free from clay lumps, organic material, and other deleterious substances.

Use sand that, when tested in accordance with Test Method TEX-106-E, has a maximum Plasticity Index of 7, a maximum Liquid Limit of 25, and for which a maximum of 40% passes the No. 200 sieve.

Use earth or native soil backfill consisting of soil containing no deleterious material such as trash, wood fragments, organics, or other objectionable material. Furnish the material from either the material removed from the excavation or offsite sources. The material may consist of soil classified by the Unified Soil Classification System (USCS) as CH, CL, SC, SP, SM, SW, or GC. Use earth backfill meeting the compaction requirements of this specification and which does not cause any settlement.

- 2.15. **Manholes.** Use materials for manholes in accordance with the materials requirements of Item 465, "Junction Boxes, Manholes and Inlets" and as shown on the plans, except that brick is not allowed. Use fiberglass manholes if shown on the plans.

If specified, furnish prefabricated fiberglass manholes conforming to the shape, size, dimension, and details shown on the plans. Unless otherwise shown on the plans, use manhole sections in accordance with ASTM D3753. Acceptable manufacturers: fiberglass manholes manufactured by Containment Solutions Inc., L.F. Manufacturing, Inc., or an approved equal.

Stencil the date of manufacture and name or trademark of the manufacturer in 1-in. high letters on the inside of the barrel.

Unless a larger size is specified, use a 48-in. diameter barrel for fiberglass manholes. Construct wall sections of the appropriate thickness for the depth of manhole as specified in ASTM D3753, but not less than 0.48 in. thick.

Provide a fabricated reducer, bonded at the factory to form a single continuous unit at the top of the manhole barrel to accept concrete grade rings and cast-iron frame and cover. For the reducer, use an acceptable design with enough strength to safely support HS-20 loading.

For the manhole base, use a minimum 12-in. (under the invert) precast concrete base. For precast manhole bases, use an approved steel reinforced design with enough strength to withstand the imposed loads. Include an acceptable joint in the base to receive a fiberglass pipe section forming the barrel of the manhole. Coat precast concrete base sections with Thane Coat TC300 or approved equal, as recommended by the manufacturer.

- 2.16. **Rings and Covers.** Use materials for rings and covers in accordance with the material requirements of Item 471, "Frames, Grates, Rings, and Covers." Use covers and rings conforming to the shapes and dimensions shown on the plans and marked with the wording and logos shown on the plans.

- 2.17. **Reinforcing Steel.** Furnish and place reinforcing steel in accordance with the material requirements of Item 440, "Reinforcement for Concrete."

- 2.18. **Mortar.** Furnish mortar composed of one part cement, two parts finely graded clean sand, and enough water to make the mixture plastic. When required by the Engineer, add a latex adhesive to the mortar. Use latex adhesive in accordance with the requirements of Departmental Material Specifications DMS-8110. Hydrated lime ASTM C207, Type S or lime putty may be added to the mix up to a maximum of 10% by weight of the total dry mix.

- 2.19. **Adjusting Manholes.** Furnish materials for adjusting manholes in accordance with the materials requirements of Item 479, "Adjusting Manholes and Inlets," and as shown on the plans.

- 2.20 **Nonmetallic Pipe Detection.** If installing nonmetallic pipe longitudinally underground, a method of detecting the location of the nonmetallic pipe is required. The specific method used is shown on the plans or as approved. This system may involve installing some components in the trench around the pipe which are detectable by a metal detector. Alternately, the system may involve some locating equipment capable of creating a non-destructive pressure wave which can be detected above ground using a

portable detection device with both audible and visual indicators. Ensure either system of detection is capable of accurately locating to a maximum depth of 3 ft. over the areas shown on the plans.

Ensure the selected system is capable of locating lines under earth, concrete, and asphalt surfaces. Use equipment, materials, and installation as specified by the manufacturer.

- 2.21 **Air Release and Vacuum Relief Valves.** Provide combination air valves designed to fulfill the functions of air release, permitting escape of air accumulated in the line at high points of elevation while the line is under pressure and vacuum relief. Paint the valve exterior with an epoxy shop-applied primer.
- 2.21.1 **Air Release Valves.** Provide air release valves in combination with inlet, outlet connections, and orifice as specified on the plans. For valve materials, use: ASTM 48, Class 30, cast iron; float and leverage mechanism with body and cover, ASTM A 240 or ASTM A 276 stainless steel; orifice and seat, stainless steel against Buna-N or Viton mechanically retained with hex head nut and bolt. For other valve internals, use stainless steel or bronze.
- 2.21.2 **Air Release and Vacuum Valves.** Provide single-body standard combination or duplex-body custom combination valves as shown on the plans.
- 2.21.2.1 **2-in. and 3-in. Single-Body Valves.** Provide inlet and outlet sizes as shown on the plans and an orifice sized for a 100 psi working pressure. Valve materials: for the body, cover, and baffle, use ASTM A48, Class 35, or ASTM A126, Grade B cast iron; for the plug or poppet, use ASTM A276 stainless steel; for the float, use ASTM A240 stainless steel; for the seat, use Buna-N; and for other valve internals, use stainless steel.
- 2.21.2.2 **3-in. and Larger Duplex-Body Valves.** Provide air release valves as shown on the plans. Valve materials: for the body and cover, use ASTM A48, Class 35, cast iron; for the float, use ASTM A240 stainless steel; for the seat, use Type-304, stainless steel and Buna-N; and for other valve internals, use stainless steel or bronze. Construct air release valves as specified in Section 2.21.1, "Air Release Valves."
- 2.21.3 **Vacuum Release Valves.** Provide air inlet vacuum relief valves with flanged inlets and outlet connections as shown on the plans. Valve materials: for the valve body, use ASTM B 584 bronze, copper alloy 836; for the spring, use ASTM A 313, Type 304, stainless steel; for the bushing, use ASTM B 584 bronze, copper alloy 932; for the retaining screw, use ASTM A 276, Type 304, stainless steel. Set the valves to open under a pressure differential of 0.25 psi (maximum).

3. CONSTRUCTION

- 3.1 **Excavating and Backfilling.** Excavate and backfill as required to complete the work as outlined in this specification, in accordance with construction requirements of Item 400, "Excavation and Backfill for Structures," and as shown on the plans.

Construct sewer lines in open cut trenches with vertical sides, except in those locations where the pipe is to be jacked, bored, tunneled, or augered. Construct the trench in accordance with the dimensions shown in the Excavation and Backfill Diagram.

Sheath and brace trenches to the extent necessary to maintain the sides of the trench in a vertical position throughout the construction period. Protect excavation greater than 5 ft. in depth as required in accordance with Item 402, "Trench Excavation Protection" or Item 403, "Temporary Special Shoring."

Always open and excavate the trench to the finished grade for a minimum distance of 50 ft. in advance of the previously placed joint of pipe. To allow for possible adjustment of alignment and grade, positively locate existing sewer lines which will connect to the sewer under construction, well in advance of making those connections.

Construct sanitary sewers in dry trenches. Perform additional work as necessary, such as dewatering or well- pointing, placing additional sheathing, or placing a concrete seal in the bottom of the trench, to accomplish this objective. This work, if necessary, is subsidiary to the pertinent bid items.

If it is necessary to excavate trenches adjacent to improved property, take precautions necessary to prevent damaging or impairing that property. If it is necessary to disturb grass, shrubs, driveways, etc., restore such improvements to their original condition.

3.1.1 **Existing Streets.** Unless otherwise shown on the plans, open cut existing streets.

If sanitary sewer construction requires cutting through existing streets outside the limits of new street construction, replace them in kind in conformance with the pertinent specifications in the proposal and as directed.

Cut-back the existing pavement a minimum of 1 ft. on each side of the sanitary sewer trench before replacing concrete and asphalt paving. Additional trench width may be required for unstable conditions. If this repaired area is to remain after final construction, then the repair area is to be full lane width from expansion joint to expansion joint for concrete pavement or the length of the repair for asphalt pavement.

If, in the opinion of the Engineer, a single lane closure is insufficient to maintain traffic across a trench, construct temporary access as necessary to safely maintain the traffic flow.

If the proposed sanitary sewer parallels the edge of an existing permanent pavement (i.e., concrete pavement, concrete base with asphalt surface, etc.) and is 3 ft. or less from the edge of that pavement, protect the trench with timber sheathing and bracing. Leave the bracing in place at intervals of 5 ft. maximum, for the duration of the excavation.

Keep the street surface adjacent to the trench free of surplus spoil. Place construction materials at locations that will minimize interference with the traveling public.

A maximum of 2 street intersections may be closed at any time, unless otherwise authorized by the Engineer in writing.

3.1.2 **Cutting and Restoring Pavement.** If installing sewers in streets or other paved areas, the work includes saw cutting the pavement and asphalt stabilized base (if any), removing the foundation base to neat lines, and replacing these materials after sewer excavation and backfill are complete. The type and thickness of replacement materials is shown on the plans. Performing work on or making repairs to damaged base and pavement within the project limits will be measured and paid for under the applicable specifications.

If excavating in streets or highways, maintain traffic and provide traffic control in accordance with the plans.

When allowed by the construction sequence shown on the plans or when directed, use a "temporary concrete cap" of the depth and class of concrete shown on the plans, or as otherwise directed, instead of a permanent repair.

3.2 **Bedding.** Before laying the pipe, shape the bedding material to conform to the outside diameter of the pipe as shown on the plans. Carefully prepare bell holes to fit the bell where using bell and spigot pipe.

3.3 **Laying Pipe.**

3.3.1 **General.** Lay sewers in a straight line, so that a light can be seen from one manhole to the other, even for the smaller size sewers. Accurately lay the pipe to line and grade, with the spigot end downstream entering the bell of the next joint of pipe. Fit pipes and fittings together and match them so they form a sewer with a smooth, watertight, and uniform invert. Take measures to provide uniform bearing for the entire length of the pipe.

Install sewer lines meeting the minimum separation distance from any potable water line, as required by the Design Criteria for Sewage Systems, Texas Administrative Code - Chapter 317.13, Appendix E., of the Texas Commission on Environmental Quality Regulations.

Lay pipe to the lines and grades shown on the plans. To ensure proper placement, use adequate surveying methods, equipment, and employ personnel competent in the use of this equipment. Unless otherwise approved, the maximum allowable deviation of the pipe from the horizontal and vertical alignment indicated on the plans is 0.10 ft. Measure and record the "as-built" horizontal alignment and vertical grade at a maximum of every 50 ft. on the on-site recorded plans.

Submit a mylar set of plans with this "as-built" information to the Engineer for final acceptance.

During pipe laying operations, always keep pipe trenches free of water which might impair pipe laying operations. Ensure holes for bells are of ample size to prevent bells from contacting the subgrade. Carefully grade the pipe trenches to provide uniform support along the bottom of the pipe.

Do not lay more than 50 ft. of pipe in the trench ahead of backfilling operations. If the pipe laying operations are interrupted for more than 48 hours, cover the pipe laid in the trench simultaneously on each side of the pipe to avoid lateral displacement of the pipe and damage to the joints. If adjustment of the position of a length of pipe is required after it has been laid, remove and re-lay it in accordance with these specifications at no expense to the Department. After completing pipe laying and joining operations, clean the inside of the pipe and remove any debris.

Use caution to prevent damage to the coating or polyethylene film wrap when placing backfill. Place backfill in accordance with this specification.

Do not place more than 1,000 ft. of pipe on publicly used streets ahead of the trench excavating machine. Obtain permission, in writing, from the owner or the owner's agent before placing materials or equipment on private property.

Regardless of the type of pipe being used, place sand bedding in the bottom of the trench and compact it to a depth of 6 in. Carefully grade the bedding and excavate bell holes.

Lay pipe with bell ends facing in the direction of laying, unless otherwise directed.

Adjust the pipe and fittings to be at their proper locations and prepare each joint as specified on the plans and by the Engineer. While laying each joint of pipe in the trench, center the spigot end in the bell of the previously laid pipe. Force the pipe home and bring it to correct line and grade. Ensure each length of pipe rests on the bottom of the trench throughout its entire length.

If laying of pipe is discontinued for the day or for an indefinite period, tightly place a cap or plug in the end of the last pipe laid to prevent the intrusion of water. When water is excluded from the interior of polyvinyl chloride pipe, place enough backfill on the pipe to prevent floating. Schedule the work to prevent the possibility of floatation. Remove pipe that has floated from the trench and re-lay it as directed.

When PVC pipe is assembled on top of the trench, allow it to cool to ground temperature before backfilling to prevent pull out due to thermal contraction.

3.3.2

PVC Pipe and Fittings. Splicing is not allowed unless the required length of a straight section of pipe exceeds 30 ft. The Engineer may waive this requirement to meet special conditions.

Use devices required for attaching the pipe to portions of structures or to other types of pipe that are shown on the plans or as approved. Install a water stop gasket and clamp at each PVC connection to a manhole.

After installing, clean and paint pipe and fittings which are exposed to view in the completed structure, as shown on the plans.

3.3.3. **Ductile-Iron Pipe and Fittings.** Provide and operate proper and suitable tools and appliances for safely and conveniently handling the pipe and fittings. Use caution to prevent damaging the pipe coating. Examine pipe for defects and do not lay pipe that is known to be defective. If any defective pipe is discovered after being laid, remove and replace it with sound pipe at no expense to the Department. If the pipe requires cutting, perform it in conformance with the manufacturer's recommendations for pipe 12 in. in diameter and smaller. Use approved cutting methods for larger pipes. Ensure each cut is smooth and at right angles to the axis of the pipe.

3.3.4. **Thrust Restraint.** Unless otherwise shown on the plans, provide Portland cement concrete thrust blocking for force mains up to 12-in. in diameter, to prevent movement of buried lines under pressure at bends, tees, caps, valves, and hydrants. Place concrete in accordance with details on the plans. Place thrust blocks between undisturbed ground and fittings. Anchor the fittings to the thrust blocks so that the pipe and fitting joints are accessible for repairs. Extend the concrete from 6 in. below the pipe or fitting to 12 in. above.

For force mains larger than 12 in. in diameter, and where indicated on the plans, provide restrained joints conforming to the requirements of the force main pipe material specifications. Install restrained joints for the length of pipe on both sides of each bend or fitting for the full length shown on the plans.

Horizontal and vertical bends between zero and 10 degrees deflection angle will not require thrust blocks or harnessed or restrained joints.

For horizontal and vertical bends between 10 degrees and 90 degrees deflection angle, provide thrust restraint as shown on the plans.

Provide thrust restraint at tees, plugs, blowoff drains, valves, and caps, as indicated.

Reinforced concrete encasement of force main pipe and fittings may be used in lieu of manufactured joint restraint systems. Provide alternate joint restraint systems using reinforced concrete encasement that conform to following design requirements:

- Ensure design calculations are performed and sealed by Professional Engineer licensed in the State of Texas.
- Base design calculations upon soil parameters qualified in a geotechnical report for the site where alternative thrust system will be installed. When data is not available for the site, use parameters recommended by a geotechnical engineer.
- The design system pressure is the specified test pressure.
- Utilize the following safety factors in sizing the restraint system:
 - Apply a factor of safety equal to 1.5 for passive soil resistance.
 - Apply a factor of safety equal to 2.0 for soil friction.
- Contain the encasement entirely within the standard trench width and terminate it on both ends at and pipe bell or coupling.
- Design the concrete encasement reinforcement steel for all loads, including internal pressure and longitudinal forces. Design the concrete in accordance with ACI 318. and

Install piping and fittings true to alignment with rigid support. Provide anchorage where required. Repair any damage to linings before the pipe is installed. Clean out each length of pipe before installation. Adhere to the pipe manufacturer's recommendations.

Ensure the deflection at joints does not exceed that recommended by the pipe manufacturer. Provide fittings, in addition to those shown on the plans, if required, in areas where conflict exists with existing facilities.

Fabricate flanged joints using gaskets, bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. Use the number and size of bolts that conform to the same ANSI standard as the flanges.

Tighten bolts in flanged joints or mechanical joints alternately and evenly.

- 3.3.5 **Fiberglass Pipe.** Do not use stiffening ribs or rings. Provide a water stop flange (wall pipe) for connection to existing cast-in-place manholes.

If the pipe is cut in the field or the interior lining is disturbed, re-coat the interior with a similar quantity of the liner resin in accordance with this specification.

Do not exceed forces recommended by the manufacturer for coupling pipes. If excessive force is required, remove the coupling, determine the source of the problem and correct it.

When jointing the pipe, do not exceed the deflection angle, measured by mandrel, permitted by the manufacturer, unless otherwise directed.

Either affix gaskets to the pipe by means of a suitable adhesive or install them in such a manner to prevent the gasket from rolling out of the pipe's pre-cut groove.

- 3.4 **Manholes.** Construct manholes in accordance with Item 465, "Junction Boxes, Manholes and Inlets" and with the details shown on the plans.

- 3.5 **Adjusting Manholes.** Adjust manholes in accordance with the construction requirements of Item 479, "Adjusting Manholes and Inlets" and as shown on the plans.

Elevations of manholes may be raised by using precast concrete rings. Elevations of manholes may be lowered by removing existing cast-in-place walls, adjusting rings, or the top section of the barrel below the new elevation and then rebuilding or raising the elevation to the proper height.

Salvage and reuse cast-iron frames and covers. Protect or block off manhole or inlet bottoms by using wood forms shaped to fit so that no debris or soil falls to the bottom during adjustment.

Install a cast-in-place slab at the top of the manhole barrel to receive the cast-iron frame and cover. Form concrete slabs a minimum of 6 in. thick. Set the cast-iron frame for the manhole cover in a full mortar bed and adjust it to the established elevation. If placing in streets, adjust covers to be flush with the top of the pavement.

The following requirements apply for fiberglass manhole adjustments: install concrete grade rings for height adjustment, as required. Construct the chimney on the flat shoulder. Do not load the manhole except on the load bearing shoulder of the manhole. The maximum adjustment height is 18 in.

Use a cut length of approved Fiberglass Reinforced Pipe (FRP) to create a finished liner inside the adjustment rings. Cut the pipe to fit between the casting and the top of the fiberglass manhole reducer. Completely seal the liner pipe to the casting and to the manhole reducer section with sealant as recommended by the manufacturer.

Set the cast-iron frame on top of the cone or adjustment rings using approved sealant materials and adjust the elevation of the casting cover to match the pavement surface. For manholes in unpaved areas, set the top of the frame a minimum of 6 in. above the existing ground line unless otherwise shown on the plans.

- 3.6 **Service Connections.** If existing service connections are tied into existing sewers which will be abandoned, reconnect such connections to the proposed sewers as shown on the plans or as directed.

If sewers are more than 6 ft. in depth from the finished grade to the top of the pipe, construct service connections by placing stacks on the sewer line.

Construct sewer stacks in a manner approved by the Engineer and in accordance with the details shown on the plans. If stacks are to be adjusted, make the adjustment in a manner as directed by the Engineer.

If sewers are 6 ft. or less in depth from the finished grade to the top of the pipe, construct service connections by placing wyes or tees in the sewer line at each location and using 1/4 or 1/8 bends where necessary to tie into the existing house sewer lead.

For stub outs, use PVC sewer pipe, 6-in. through 10-in. diameters, in accordance with ASTM D1784 and ASTM 3034 with a cell classification of 12454-B. Use a SDR (ratio of diameter to wall thickness) of 26 for pipe 12-in. in diameter or less and a SDR of 35 for larger pipe.

Use gasket-jointed PVC pipe with the gasket in accordance with ASTM D3212.

Select the service connection pipe diameter to match the existing service diameter, but use a minimum diameter of 6-in.

Furnish a one-piece prefabricated saddle, made either of polyethylene or PVC, with a neoprene gasket for connection to HDPE. Use full body fittings for new PVC installation.

For connection between a stub out and existing service, use a minimum 6-in. diameter flexible PVC coupling, Fernco Adapter, or an approved equal as needed.

Use 1/2-in. stainless steel bands to secure saddles to the liner pipe and the couplings to the service line.

Reconnect service connections, including those to unoccupied or abandoned buildings or to vacant lots, unless otherwise directed.

Include reconnected services on the as-built plans. Record the exact distance from each service connection to the nearest downstream manhole.

Test the service connection before backfilling. Use backfill in accordance with this specification and details as shown on the plans.

3.7 **Jacking, Boring, or Tunneling Pipe.**

3.7.1 **General.** Perform jacking, boring, or tunneling for sanitary sewers at the locations shown on the plans and at other locations specifically designated.

Unless otherwise shown on the plans, provide casing pipe in accordance with the requirements of Section 2.8., "Steel Casing Pipe," of this specification.

3.7.2 **Jacking.** Perform jacking in accordance with the requirements of Section 476.3.1., "Jacking," of Item 476, "Jacking, Boring, or Tunneling Pipe or Box."

3.7.3 **Boring.** Perform boring in accordance with the requirements of Section 476.3.2., "Boring or Tunneling," of Item 476, "Jacking, Boring, or Tunneling Pipe or Box."

If sewer lines cross underneath driveways (16 ft. wide or less) and sidewalks, install pipe in tight-fitting augered holes.

If the centerline of the proposed sanitary sewer is 10 ft. or less from the centerline of an 8-in. diameter or larger growing tree, place the pipe in a tight-fitting augered hole. Extend the bored hole at least 4 ft. beyond each side of the tree.

3.7.4 **Tunneling.** Perform tunneling in accordance with the requirements of Section 476.3.3., "Tunneling," of Item 476, "Jacking, Boring, or Tunneling Pipe or Box."

3.8 **Handling of Pipe and Accessories.**

3.8.1 **General.** Unload pipe, fittings, and accessories at the point of delivery and haul them to the project site. Distribute the material opposite or near to the place where it will be laid in the trench. Do not drop the materials. Do not skid or roll pipe handled on skid ways against pipe already on the ground.

Load, transport, unload, and otherwise handle pipe and fittings in a manner and by methods which will prevent damage to them. Handle and transport pipe with equipment designed, constructed, and arranged to prevent damage to the pipe, lining, and coating. Bare chains, hooks, metal bars, or narrow skids or cradles are not permitted to come in contact with the coatings. Ensure spiders are installed by the manufacturer at joint ends of fittings.

Hoist pipe from the trench side into the trench by using a sling of smooth steel cable, canvas, leather, nylon, or similar material.

During pipe construction operations, always use caution to prevent injury to the pipe, protective linings, and coatings.

If stacking pipe, package it on timbers. Place protective pads under the banding straps at the time of packaging.

If fork trucks are used to relocate pipe, pad the forks using carpet or some other suitable type of material. When relocating pipe using a crane or backhoe, use nylon straps, not chains or cables around the pipe for lifting.

Do not lift pipe using hooks at each end of the pipe.

Repair or replace any damage done to the pipe or the protective lining and coating, from any cause, during the installation of the pipeline and before final acceptance by the purchaser, at the expense of the laying Contractor, and in conformance with the applicable standards and as directed.

3.8.2 **Cleaning of Pipe and Accessories.** Remove lumps, blisters, and excess coating from the bell and spigot ends of ductile-iron pipe and fittings. Wire brush the outside of the spigot and the inside of the bell and wipe clean, dry, and free from oil and grease before laying the pipe.

Remove foreign matter or dirt from the interior of sanitary sewer pipe and accessories and from the mating surfaces of the joints before lowering the material into the trench. During and after laying by approved means, keep the pipe and accessories clean.

Use cleaning solutions, detergents, solvents, etc. with caution when cleaning PVC pipe.

3.9 **Abandoning Sanitary Sewers.** Where plans call for abandoning sanitary sewers, adhere to the following general procedure:

After the replacement main is constructed, tested, and released, and after services are transferred to the replacement line, locate the line to be abandoned and trace it back to the feeder line and at this point cut, plug, and abandon it. Grout the pipe if required by the plans.

3.10 **Removing Sanitary Sewers, Casing, Force Main, and Manholes.** Remove sanitary sewers, casing, force mains, and manholes in accordance with Item 100, "Preparing Right of Way" or as shown on the plans. This work includes removing and disposing of the pipe and appurtenances as shown on the plans or as directed. Excavation and backfill, as required, are subsidiary to this item.

3.11 **Joining Pipe and Accessories.**

3.11.1 **General.** After thoroughly cleaning the inside of the bell and the outside of the spigot, install members in conformance with the manufacturer's recommendation.

Mark pipe and accessories that are not furnished with a depth mark before assembling to assure that the spigot end is inserted to the full depth of the joint.

- 3.11.2 **Polyvinyl Chloride Pipe and Accessories.** Join plastic pipe in conformance with the instructions furnished by the manufacturer. Do not handle or install pipe joined using solvent cementing techniques, in the trench until after the joints are sufficiently "cured" to prevent weakening the joint.

Use lubrication for rubber-jacketed joints that is water soluble, non-toxic, non-supporting of bacteria growth, and has no deteriorating effect on PVC or the rubber gaskets.

- 3.11.3 **Ductile-Iron Pipe.** Except as noted on the plans, wrap ductile-iron pipe (including fittings and other appurtenances) with a polyethylene film wrap material.

- 3.11.4 **Fiberglass Pipe.** Unless otherwise shown on the plans, field connect pipe with fiberglass sleeve couplings that use elastomeric sealing gaskets as the sole means to maintain joint water tightness. Ensure the joints meet the performance requirements of ASTM D4161.

- 3.11.5 **Diversion Pumping.** Provide continuous sanitary sewer service to users of the sewer system during construction and maintenance operations, by diverting the flow around such areas. Maintain sewer flow to prevent backup or overflow onto streets, yards, and unpaved areas or into buildings, adjacent ditches, storm sewers, and waterways. Do not divert sewage outside of the sanitary sewer system. During pump operation, provide an experienced operator on site to monitor operation, adjust pumps, perform minor repairs to the system, and report problems.

- 3.12 **Installing the Nonmetallic Pipe Detection System.** Install the nonmetallic pipe detection system concurrently with placing the proposed pipe. Install this system as specified by the manufacturer and as approved. Install a complete, operational system that is satisfactory to the owner of the utility.

- 3.13 **Air Release and Vacuum Valves.** Inspect valves in open and closed positions to verify they are in satisfactory working condition. Install valves in conformance with the manufacturer's recommendation. Set manholes and vaults plumb as shown on the details and center manholes on valves. Provide above-ground vents for manholes and vaults as shown on the plans.

4. TESTING SANITARY SEWERS FOR LEAKAGE

- 4.1 **Basic Requirements.** Ensure sewers, when tested in accordance with this specification, do not show leakage of more than 50 gallons per 24 hours per inch of inside diameter, per mile of sewer.

- 4.2 **General.** Conduct testing under the supervision of the Engineer. It is the Engineer's option to conduct tests by either the infiltration method or the exfiltration method. On sewers larger than 24 in. in diameter, the tests may consist of visual inspection inside the sewer to locate leaks. The visual inspection method will be used for monolithic sewers. Where the section of sewer to be tested is entirely below the ground water table that will provide the required test head, the test will ordinarily be made by the infiltration method.

Test the first section of each size or type of sewer laid on the job that is 300 ft. or greater in length, installed by each crew, to determine the adequacy of the materials and methods used and the proficiency of the crew. Backfill this section to a minimum of 18 in. above the top of the pipe and test it without undue delay. If this initial section fails to meet the requirements of the test, make changes in methods, materials, and crew as necessary to correct the deficiency. It is the Engineer's option to require the Contractor to test any or all of the remaining sections of the sewer.

Completely backfill sewers, other than the first section described above, except at the stacks, before testing. It is the contractor's option to make preliminary tests with a minimum of 18 in. of backfill over the pipe to determine if any need for repairs in the sewer is indicated. Such preliminary tests are entirely for the Contractor's information and will not be accepted instead of final tests.

Unless notified that the test will be made by the infiltration method, leave the tops of the stacks exposed and unplugged until after performing the leak test. Temporarily extend upward, stacks which may terminate below the test level by installing an additional length of pipe in the top.

Notify the Engineer a minimum of 24 hours in advance of performing the tests.

If the bottom of the trench is below the ground water level, provide suitable means at each manhole for readily determining the ground water level until testing is completed or waived by the Engineer. This may, as an example, consist of a pipe not less than 3 in. in diameter, plugged at the bottom and perforated for at least the lower 3 ft., with the perforations wrapped with at least two thicknesses of burlap, set in the trench before backfilling. Remove such pipes or cut them off at least 2 ft. below the ground after testing is completed or waived by the Engineer. Before removing, protect the pipes against damage and exclude earth or other material from them.

It is the Engineer's option, to vary the procedures described below under "infiltration test" and "exfiltration test" provided the methods used give an accurate measurement of the leakage occurring at the water levels specified.

4.3 **Testing Procedures (Gravity System).**

4.3.1. **Infiltration Test.** This test may be used where the ground water level rises to a plane that provides a test head not less than that specified for exfiltration tests. Stop all pumps and allow the ground water to return to its normal level (at least the elevation as indicated above) and allow it to remain so for at least 24 hours (the pipe will be filled with water to the overflow depth) and ensure leakage flows at a uniform rate through the opening in the plug in the downstream end of the section of sewer being tested before starting the test. Determine leakage by measuring the flow through the opening in the downstream plug during a given time. Perform 5 separate measurements over a 2-hour period. Use the average of the measurements, discarding any 1 of the 5 measurements, except the last, that varies by more than 50% from the average of the other 4. If the results of the test are otherwise satisfactory, but the last of the 5 measurements shows leakage in excess of that permitted, continue the tests to determine if additional leaks have developed during testing.

4.3.2. **Exfiltration Test.** It is the Contractor's option to keep the pipe full of water for 24 hours before the test to permit absorption by the pipe. If the Contractor wishes to fill the pipe, notify the Engineer by the time backfill is completed. The Engineer will then give notice at least 48 hours before the test will be made to allow time for filling and soaking the pipe.

Supply plugs for this purpose. At least 2 hours before the test starts, bleed off the water to below the level of the top of the pipe at its lower end and allow it to remain so until the water level remains static at this level or continues to fall. Perform the test in the following manner:

Insert a watertight plug equipped with a pipe riser and brace it in the inlet opening of the downstream manhole. Insert and brace a similar plug, equipped with a suitable vent pipe that will permit the air to escape in the pipe at its upper end, in the outlet opening of the upstream manhole.

Fill the sewer and risers with water up to a level that is either 2-1/2 ft. above the highest point in the sewer pipe, service connection, or groundwater table, whichever is highest, plus the vertical distance from the invert of the sewer at its lower end up to the level of the ground water, where such ground water exists above the invert of the sewer.

Fill the sewer with water as a continuous operation as rapidly as the supply will permit. Complete this filling in a minimum of 2 hours for sewers 12 in. in diameter or smaller, 3 hours for sewers 15 in. through 24 in. in diameter, and 4 hours for larger sewers. Over a one-hour period, measure the leakage during the

test period by adding measured quantities of water to maintain the water level in the test structure. The quantity of water added to maintain the initial water level is the amount of leakage.

Test criteria and allowable leakage for exfiltration and infiltration tests are shown in Table 5.

Table 5
Test Criteria Table for Exfiltration and Infiltration Water Tests

Diameter of Riser or Stack ¹	Volume per Inch of Depth		Allowable Leakage ²	
	(in.)	(cu. in.)	(gal.)	Pipe Diameter (in.)
1	0.7854	0.0034	6	0.0039
2	3.1416	0.0136	8	0.0053
2.5	4.9087	0.0212	10	0.0066
3	7.0686	0.0306	12	0.0079
4	12.5664	0.0306	15	0.0099
5	19.6350	0.0544	18	0.0118
6	28.2743	0.1224	21	0.0138
8	50.2655	0.2176	24	0.0158
			27	0.0177
			30	0.0197
			36	0.0237
			42	0.0276
1. For other diameters, multiply the square of diameter, by the value for 1 in. diameter.			2. Equivalent to 50 gallons per inch of inside diameter per mile in 24 hours.	

4.3.3

Low Pressure Air Test. For sanitary sewers of less than 36-in. average inside diameters, conduct testing in sections less than 300 ft. long. For shorter runs, conduct the low pressure air test from manhole to manhole. Test 36-in. and larger sewer mains, every two runs of pipe with one pipe joint connection in between.

Perform the low pressure air test in accordance with ASTM C828 and ASTM C924, using holding times not less than those listed in Tables 6, 7, and 8.

Low Pressure Air Test:

Note 1: Tables are based on the following equation:

$$T = 0.0850(D)(K)/(Q)$$

- T = Time for pressure to drop 1.0 pound per square inch gauge (psig), in seconds
- K = 0.000419(D)(L), but not less than 1.0
- D = Average inside diameter, in inches
- L = Length of line of the same pipe size being tested, in feet
- Q = Rate of loss = 0.0015 Cubic feet/min./sq. ft. of internal surface area

Note 2: Add 1.0 psig for each 2.3 ft. of water above the highest point in the sewer.

Note 3: When two sizes of pipe are involved, compute the time by using the ratio of the lengths involved. For example, using 400 ft. of 10-in. pipe and 200 ft. of 6-in. pipe:

$$\begin{aligned} \text{Time} &= \frac{\text{Length}_1 \times \text{Time}_1 + \text{Length}_2 \times \text{Time}_2}{\text{Length}_1 + \text{Length}_2} \\ &= \frac{400 \times 15:50 + 200 \times 5:40}{400 + 200} &= \frac{400 \times 950 + 200 \times 340}{400 + 200} \\ &= 747 \text{ Seconds} &= 12:27 \text{ min:sec} \end{aligned}$$

Acceptance Testing for Sanitary Sewers

Table 6
Time Allowed for Pressure Loss from 3.5 psig to 2.5 psig

Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft.)	Time for Longer Length (sec.)	Specification Time for Length (L) Shown in (min:sec)				
				100 ft.	150 ft.	200 ft.	250 ft.	300 ft.
6	5:40	398	0.8548	5:40	5:40	5:40	5:40	5:40
8	7:33	298	1.5196	7:33	7:33	7:33	7:33	7:36
10	9:27	239	2.3743	9:27	9:27	9:27	9:54	11:52
12	11:20	199	3.4190	11:20	11:20	11:20	14:15	17:06
15	14:10	159	5.3423	14:10	14:10	17:48	22:16	26:43
18	17:00	133	7.6928	17:00	19:14	25:39	32:03	38:28
21	19:50	114	10.4708	19:50	26:11	34:54	43:38	52:21
24	22:40	99	13.6762	22:48	34:11	45:35	56:59	68:23
27	25:30	88	17.3089	28:51	43:16	57:42	72:07	68:33
30	28:20	80	21.3690	35:37	53:25	71:14	89:02	106:51
33	31:10	72	25.8565	43:06	64:38	86:11	107:44	129:17

Table 7
Time Allowed for Pressure Loss from 3.5 psig to 2.5 psig

Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft.)	Time for Longer Length (sec.)	Specification Time for Length (L) Shown in (min:sec)			
				350 ft.	400 ft.	450 ft.	500 ft.
6	5:40	398	0.8548	5:40	5:42	6:25	7:07
8	7:33	298	1.5196	8:52	10:08	11:24	12:40
10	9:27	239	2.3743	13:51	15:50	17:48	19:47
12	11:20	199	3.4190	19:57	22:48	25:39	28:30
15	14:10	159	5.3423	31:10	35:37	40:04	44:31
18	17:00	133	7.6928	44:52	51:17	57:42	64:06
21	19:50	114	10.4708	61:05	69:48	78:32	87:15
24	22:40	99	13.6762	79:47	91:10	102:34	113:58
27	25:30	88	17.3089	100:58	115:24	129:49	144:14
30	28:20	80	21.3690	124:39	142:28	160:16	178:05
33	31:10	72	25.8565	150:50	172:23	193:55	215:28

Table 8
Time Allowed for Pressure Loss from 3.5 psig to 2.5 psig

Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft.)	Time for Longer Length (sec.)	Specification Time for Length (L) Shown in (min:sec)	
				550 ft.	600 ft.
6	5:40	398	0.8548	7:50	8:33
8	7:33	298	1.5196	13:56	15:12
10	9:27	239	2.3743	21:46	23:45
12	11:20	199	3.4190	31:20	34:11
15	14:10	159	5.3423	48:58	53:25
18	17:00	133	7.6928	70:31	76:56
21	19:50	114	10.4708	95:59	104:42
24	22:40	99	13.6762	125:22	136:46
27	25:30	88	17.3089	158:40	173:05
30	28:20	80	21.3690	195:53	213:41
33	31:10	72	25.8565	237:01	258:34

4.3.4 **Leakage Testing for Manholes.** After completing manhole construction, wall sealing, or rehabilitation, but before backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures as described below.

Plug influent and effluent lines, including service lines, with suitably-sized pneumatic or mechanical plugs. Use plugs that are properly rated for the pressures required for the test. Adhere to the manufacturer's safety and installation recommendations. Place plugs a minimum of 6 in. outside of manhole walls. Brace the inverts to prevent lines from dislodging if lines entering the manhole have not been backfilled.

4.3.4.1 **Vacuum Testing.** Install the vacuum tester head assembly at the top access point of the manhole and adjust it for a proper seal on the straight top section of the manhole structure. Following the manufacturer's instructions and safety precautions, inflate the sealing element to the recommended maximum inflation pressure. Do not over-inflate the sealing element.

Evacuate the manhole with a vacuum pump to 10 in. of mercury (Hg) then disconnect the pump and monitor the vacuum for the time period specified in the Table 9.

Table 9
Vacuum Test Time Table

	Time in Seconds, by Pipe Diameter		
	48 in.	60 in.	72 in.
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
See Note	5.0	6.5	8.0
Note: Add T times for each additional 2-ft. depth. (The values listed above have been extrapolated from ASTM C924-85)			

If the drop in vacuum exceeds 1 in. of mercury (Hg) over the specified time period tabulated above, locate the leaks, complete repairs necessary to seal the manhole, and repeat the test procedure until satisfactory results are obtained.

4.3.4.2 **Hydrostatic Exfiltration Testing.** Perform hydrostatic exfiltration testing as follows: seal the wastewater lines entering the manhole with an internal pipe plug, then fill the manhole with water, and maintain it full for a minimum of one hour. The maximum leakage allowed for hydrostatic testing is 0.025 gallons per foot diameter per foot of manhole depth per hour.

If the water loss exceeds the amount tabulated above, locate the leaks, complete repairs necessary to seal the manhole, and repeat the test procedure until satisfactory results are obtained.

4.4 **Testing Procedures (Pressure or Force Main System).** After each section of force main is completed and can be isolated so high pressure cannot force test water into the operating system, hydrostatically test it. Perform such testing in accordance with Section 4 of AWWA C-600-77, as modified below:

- First, flush the test section with open bleeds with the flow controlled at the feed from the operating system so that the flushing pressure is always well below that of the operating system.
- Momentarily pressurize the pipe to 160 psi as a "burst" test. Conduct the leak test at a pressure of 140 psi.
- Pipe installations exceeding the leakage determined by the following formula will not be accepted:

$$L = \frac{(S) (D) (P)^{0.5}}{133,200}$$

in which (L) is the allowable leakage, in gallons per hour; (S) is the length of pipe in feet; (D) is the nominal inside diameter of the pipe in inches; and (P) is the average test pressure during the leakage test, in pounds per square inch gauge.

- After removing temporary inserts installed for hydrostatic testing, and before backfilling, leave the replacement piping exposed for visual inspection for leakage under normal pressure (after disinfection).

- 4.5 **Deflection Test of Thermoplastic Pipe (PVC, etc.).** Thirty days after backfilling, test flexible pipe (PVC, etc.) lines for deflection by pulling a mandrel or an approved deflectometer through the line. Perform mandrel testing in accordance with ASTM D3034 or F794. Remove and reinstall sections indicating 5% deflection or more, then retest for leakage and deflection. Mandrel testing is not required for stubs.
- 4.6 **Defective Sewers.** Remove sections of the sewer that show leakage exceeding that which is permitted by these specifications and re-lay them or otherwise make good by repairing using approved methods and materials. Perform permanent type repairs. Repair individual leaks that may appear whether or not the overall section meets the leakage requirements. Individual leaks will ordinarily be revealed by looking through the sewer with a light when the ground water level is over the sewer, or immediately after water from exfiltration tests is emptied from the sewer. Settlement in the backfill during exfiltration tests will be taken as an indication of leakage in the sewer.
- 4.7 **Retests.** After completing repairs, retest for leakage those sewers which failed to meet the requirements of the leak test.
- 4.8 **Responsibility of the Department.** The Engineer will observe the sanitary sewer construction and other contributing work. He or she will monitor the testing of this system for compliance with the plans and specifications.
- 4.9 **Responsibilities of the Contractor.** Conduct tests and supply labor, materials, and equipment required to perform the tests described in this specification.

5. MEASUREMENT

This Item will be measured as follows:

- 5.1 **Sanitary Sewers** will be measured by the foot, of the various sizes, types, and wall thickness (if applicable), of sanitary sewer specified, complete in place, tested, and accepted by the Engineer. Sanitary sewer will be measured longitudinally along the centerline of the sewer between the inside faces of the manholes.

If the installation involves a connection to an existing sewer line, the measurement will be made from the end of the existing sewer line to the inside face of the manhole on the work being measured.

Sanitary sewer pipe will be measured as described above and classified as sanitary sewers for the purposes of payment.

Wyes, tees, and bends are subsidiary to this Item. Include them in the measurement for payment of pipe sewer main in which they are installed. Plugs are subsidiary to the pertinent bid items.

- 5.2 **Steel Casing** will be measured by the foot of the various sizes installed by the open cut method complete in place and accepted by the Engineer. Steel casing will be measured longitudinally along the

centerline of the casing pipe. The conditions, etc., regarding the measurement of sanitary sewers stated under Section 5.1. above also apply to casing pipe.

- 5.3 **Manholes** will be measured by each manhole, of the various types specified, complete in place.
- 5.4 **Adjusting Manholes** will be measured by each manhole adjusted.
- 5.5 **Jacking, Boring, or Tunneling** for sanitary sewers and steel casing will be measured by the foot of the various sizes, types, and wall thickness (if applicable) specified of sanitary sewer or steel casing jacked, bored, or tunneled.
- 5.6 **Service Connections** will be measured by each complete disconnection (abandoned connection) or reconnection of the material, type, diameter, and depth range (0 to 10 ft., 10-15 ft., or greater than 15 ft.) specified for each sanitary sewer service. The depth will be measured from the natural ground level to the flow line of the sanitary sewer main at the point of reconnection, for the Contractor's information only. One or more connections discharging into a common point will be considered as one service connection.
- 5.7 **Abandoning Sanitary Sewers** will be measured by each sewer abandoned of the sizes specified.
- 5.8 **Cutting and Restoring Pavement** will be measured by the square yard, of the depths specified.
- 5.9 **Air Release and Vacuum Relief Valves** will be measured by each valve assembly installed of the various sizes and types specified.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit prices bid for the items described below. These prices are full compensation for furnishing materials and their preparation; for excavation and backfill; for preparation, shaping, and fine grading the bottom of the trench; for cutting and restoring existing pavement; for hauling, placing, and joining of pipes, valves, and fittings; for constructing bollards, vent piping, stacks, and manholes; and for necessary appurtenances and other items of materials, labor, equipment, tools, and incidentals.

- 6.1 **Sanitary Sewers.** Payment for sanitary sewers will be made at the unit price bid for "Sanitary Sewers" of the various sizes, types, and wall thickness (if applicable) specified, complete in place. Plastic liner is required for concrete pipe interior surfaces and is subsidiary to this bid Item. An internal liner resin is required for centrifugally cast fiberglass pipe and is subsidiary to this bid Item.

Unless otherwise specified on the plans or this specification, excavation, disposing of unsuitable excavated material, backfilling, and the material used for backfill for the complete installation of the sanitary sewer system are subsidiary to and included in the unit price bid for the pipe and any structure for which payment is required.

Fittings, including necessary concrete blocking, pipe clamps, nipples, pipe coatings, lubricants, etc., are subsidiary to the sanitary sewer mains in which they are installed. If additional fittings are required due to plan changes or alterations in line or grade, they will be subsidiary to the sanitary sewer lines in which they are installed.

- 6.2 **Steel Casing.** Payment for steel casing will be made at the unit price bid for "Casing (Steel)(Sanitary Sewer)" of the various sizes specified, installed by the open cut method, complete in place.
- 6.3 **Manholes.** Payment for manholes will be made at the unit price bid for "Manholes (Sanitary Sewer)" of the various types specified, complete in place. Rings, covers, and steps are subsidiary to this bid Item.

6.4 **Adjusting Manholes.** Payment for each manhole adjusted will be made at the unit price bid for "Adjusting Manholes (Sanitary Sewer)." The excavation and backfill required are subsidiary to this bid item.

6.5 **Jacking, Boring, or Tunneling.** Payment for jacking, boring, or tunneling of sanitary sewer will be made at the unit price bid for "Jacking, Boring, or Tunneling (Sanitary Sewer)" of the various sizes, types, and wall thicknesses (if applicable) specified. This price includes furnishing the pipe.

Payment for jacking, boring, or tunneling steel casing will be made at the unit price bid for "Jacking, Boring, or Tunneling Casing (Steel) (Sanitary Sewer)" of the various sizes and wall thickness specified (applicable only if exceeding minimum thickness shown in Section 2.8., "Steel Casing Pipe," of this specification). This price includes the steel casing.

Sanitary sewer placed in casing will be paid for at the unit price bid for "Sanitary Sewers" as described above.

Excavating, backfilling, backfill material, and disposing of the unsuitable excavated material caused by jacking, boring, or tunneling pipe or casing, are subsidiary to and included in the unit price bid for the pipe or casing jacked, bored, or tunneled.

6.6 **Service Connections.** Payment for service connections will be made at the unit price bid for "Service Connections (Sanitary Sewer)." This payment includes any sewer stacks required. Excavation and backfill associated with disconnection or reconnection are subsidiary to this bid item.

No separate payment will be made for an abandoned service connection if the service to be abandoned is within 4 ft. of an active connection. Payment for only one abandoned service connection will be allowed when a second abandoned connection is within 4 ft. of the first.

6.7 **Abandoning Sanitary Sewers.** Payment for abandoning sanitary sewer will be made at the unit price bid for "Abandoning Sanitary Sewer" of the sizes specified. Excavation and backfill required to abandon the sanitary sewer are subsidiary to this bid item. Where grout is required, as shown on the plans, it is subsidiary to this bid item.

6.8 **Cutting and Restoring Pavement.** Payment for cutting and restoring pavement will be made at the unit price bid for "Cutting and Restoring Pavement" of the depths specified. Excavation below the pavement and base is subsidiary to this bid item.

6.9 **Air Release and Vacuum Relief Valves.** Payment for Air Release and Vacuum Relief Valves will be made at the unit price bid for "Air Release Valve," "Air Release and Vacuum Relief Valve," or "Vacuum Relief Valve" of the various sizes specified. This price is full compensation for valves, fittings, vent piping, bollards, necessary appurtenances, and incidentals.

Trench excavation protection or temporary special shoring required for trenches which are greater than 5 ft. in depth, and sloping the sides of those trenches to preclude collapse, will be measured and paid for as required by Item 402, "Trench Excavation Protection" or Item 403, "Temporary Special Shoring."

Furnishing and placing bedding material is subsidiary to the pertinent bid items.

Furnishing and installing a complete, operational nonmetallic pipe detection system, and the materials necessary for this system are subsidiary to the pertinent bid items.

Unless otherwise specified on the plans, repair curbs, pavement, base material, concrete riprap, and sidewalks damaged by construction operations at no expense to the Department, if such damaged items are not part of the Contract.

Testing sanitary sewers for leakage, including labor, materials, and equipment necessary to perform the tests, is subsidiary to the pertinent bid items.

Special Specification

7049 Water Mains

1. DESCRIPTION

Furnish labor, materials, and equipment necessary to provide a complete water main system in conformance with the plans and specifications, and in compliance with the Department's Utility Accommodations Policy (Title 43, T.A.C., Sections 21.31-21.55). Construct water mains of the sizes, materials, and dimensions shown on the plans including pipe, joints, and connections to new and existing pipes, casing, valves, fittings, fire hydrants, meters, blocking, etc., as many as may be required to complete the work.

Furnish material and equipment for encasing existing water lines with split steel encasement pipes using the open cut method in accordance with this specification.

The abbreviations AWWA, ASA, ASTM, ANSI, AASHTO, NACE, NSF, SSPC, and TCEQ used in this specification refer to the following organizations or technical societies:

- AWWA American Water Works Association
- ASA American Standards Association
- ASTM American Society for Testing and Materials
- ANSI American National Standards Institute
- AASHTO American Association of State Highway and Transportation Officials
- NACE National Association of Corrosion Engineers
- NSF National Sanitation Foundations
- SSPC Steel Structural Painting Council
- TCEQ Texas Commission on Environmental Quality

References to specifications of the above organizations mean the latest standard or tentative standard in effect on the date of the proposal.

2. MATERIALS

All materials must conform to the requirements of this Item, the plans and the following Items:

- Item 421, "Hydraulic Cement Concrete"
- Item 440, "Reinforcement for Concrete"
- Item 441, "Steel Structures"
- Item 465, "Junction Boxes, Manholes, and Inlets"
- Item 471, "Frames, Grates, Rings, and Covers"

2.1. **General.** Provide new and unused materials for this project unless otherwise stated in the plans or proposal.

Pipe 6 in. or larger is acceptable to the Texas Fire Insurance Commission without penalty for use in water works distribution systems.

For water mains less than 24 in. in diameter, use casing insulators between the water main and casing unless otherwise shown on the plans. For water mains 4 in. through 14 in., use 8 in. wide casing insulators.

For water mains 16 in. through 20 in., use 12 in. wide insulators. For pipe materials up to 12 in., use Pipeline Seal and Insulator Model C8G-2 or approved equal. For water mains larger than 12 in. use Pipeline Seal and

Insulator Model C12G-2 or approved equal. Casing end seals: Pipeline Seal and Insulator Model C or approved equal.

2.2. **Steel Pipe and Fittings.**

2.1.1 **Steel Carrier Pipe.** Provide steel pipe for use as carrier pipe in the distribution system, conforming to the requirements of AWWA Standard C200. Install steel pipe 20 in. and smaller as aerial crossings, above-ground piping, and for encasement sleeves only. Do not bury steel pipe that is 20 in. and smaller directly or within a casing.

For pipe 24 in. and greater, conform to the requirements of AWWA C200, C207, C208 and AWWA M11 except as modified in this specification. Furnish pipe and fittings that have manufacturer's certifications ensuring that they have been hydrostatically tested at the factory in accordance with AWWA C200, Section

3.4. Ensure pipe steel meets the requirements of ASTM A36, ASTM A570 Grade 36, ASTM A53 Grade B, ASTM A135 Grade B, or ASTM A139 Grade B as a minimum. Pipe is also subject to the requirements of Underwriters Laboratories, Inc. Specification for "Steel Pipelines for Underground Water Service."

Provide pipe and fittings to withstand the most critical simultaneous application of external loads and internal pressures based on the minimum of AASHTO HS-20 loading, AREMA E-80 loads, depths of bury as indicated on the plans, and the most critical groundwater level condition. The pipe design conditions follow:

- Working pressure = 100 psi.
- Hydrostatic field test pressure = 150 psi.

For pipe design (24 in. and larger) conform to AWWA M11 with the following conditions:

- Design stress due to working pressure: The maximum is 50% of the minimum yield strength or 16,500 psi maximum stress for mortar-coated pipe.
- Design stress due to hydraulic test pressure: The maximum is 75% of the minimum yield strength or 24,750 psi maximum stress for mortar-coated pipe.
- Modulus of soil reaction (E'), <1,500 psi.
- Unit weight of fill (w) > 120 pcf.
- Deflection lag factor (D1) = 1.2.
- Bedding constant (K) = 0.1.
- Fully saturated soil conditions: hw = h = depth of cover above top of pipe.
- Maximum deflection from specified diameter = 3% for flexible coatings.

Provide pipe and fittings that have been designed by a licensed Engineer. Before manufacturing, submit these signed, sealed, and dated calculations for approval.

Supply pipe in double random lengths unless otherwise shown on the plans. Bevel the ends of the pipe for field butt welding as shown on the plans.

Provide a minimum of 3/8 in. inside joint recess between ends of pipe in straight pipe sections.

Provide a minimum allowable steel wall thickness in accordance with Tables 1 and 2 for HS-20 live loads and depths of bury up to 16 ft.

**Table 1
Carrier Pipe (20 in. and Smaller)**

Nominal Pipe Size (in.)	Outside Diameter (in.)	Min Wall Thickness (in.)	Approximate Weight Per Lineal Ft., Uncoated (lb.)
4	4.500	0.250	11.35
6	6.625	0.280	18.97
8	8.625	0.322	28.55
10	10.750	0.365	40.48
12	12.750	0.375	49.56
16	16.000	0.375	62.58
20	20.000	0.375	78.60

**Table 2
Carrier Pipe (24 in. and Larger)**

Net Inside Diameter (in.)	Min Wall Thickness (in.)	
	Flexible Coating	Mortar Coating
24	0.149	0.136
30	0.149	0.136
36	0.178	0.163

Note: Refer to the plans for carrier pipe thickness. However, never use a pipe wall thickness less than that defined in the above tables.

2.1.2

Steel Casing Pipe. Ensure pipe intended for use as casing pipe is manufactured in accordance with Section 2.2.1, "Steel Carrier Pipe," except to ensure that the minimum allowable steel wall thickness conforms to those shown in Table 3 for HS-20 live loads and depth of bury of up to 16 ft.

**Table 3
Casing Pipe (Encasement Sleeves)**

30 in. and Smaller			
Casing Pipe Size (in.)	Outside Diameter (in.)	Min Wall Thickness (in.)	Approximate Weight Per Lineal Ft., Uncoated (lb.)
8	8.625	0.219	19.64
10	10.750	0.219	24.60
12	12.750	0.219	29.28
16	16.000	0.219	36.86
18	18.000	0.250	47.39
20	20.000	0.250	52.73
24	24.000	0.250	63.41
30	30.000	0.250	79.43

Note: Refer to the plans for casing thickness. However, never use a pipe wall thickness less than that defined in the above table.

Provide steel casing sections for split casing in lengths a maximum of 20 ft. Ensure each section is split in half-sections. Bevel the ends and split sections for field butt-welding.

Steel casing pipe is not required to carry the label of the Underwriters Laboratories, Inc.

2.1.3

Steel Pipe Fittings. Provide factory forged steel pipe fittings unless otherwise shown on the plans. Ensure the wall thickness is equal to or greater than the pipe to which the fitting is to be welded. Bevel the ends of the fitting for field butt-welding.

Provide approved sleeve-type flexible and flange adaptor couplings. Ensure the thickness of the middle ring is equal to or greater than the thickness of the pipe wall.

Provide restraint joint connections for 16 in. and larger water main piping shown on the plans to have restraint lengths, unless otherwise shown on the plans. Joints are to be double-welded at butt or lap joints at aerial crossings as shown on the plans. Use flanged joint at valves.

Elbows: Provide 2-piece for 0° to 22.5°; 3-piece for 23° to 45°; 4-piece for 46° to 67.5°; and 5-piece for 68° to 90°, unless otherwise shown on plans.

Outlets: Reinforced in accordance with AWWA M11, Sections 13.3-13.7, AWWA C200, and AWWA C208. Provide interior lining and exterior coating in accordance with paragraphs on coating and lining, and matching pipe to access inlets, service outlets, test inlets, and air-vacuum valve and other outlets, including riser pipes.

Radius: The minimum radius is 2.5 times pipe diameter.

- 2.1.4 **Hydrostatic Test of Pipe.** Ensure the pipe manufacturer performs hydrostatic testing in accordance with AWWA C200, Section 3.5.3, at the point of manufacture, conducts the test for a minimum of 2 min., and thoroughly inspects the pipe. Repair or reject pipe revealing leaks or cracks. Obtain from the manufacturer and submit to the Engineer, the manufacturer's written certification that the pipe and fittings used on this project have passed the hydrostatic test.

Calibrate pressure gauges within 1 yr. before testing, as specified in AWWA C200, Section 1.04 L.

- 2.2.5 **Butt Straps for Closure Piece.** Provide a minimum 12 in. wide split butt strap; minimum plate thickness equal to the thinnest member being joined; fabricated from material equal in chemical and physical properties to the thinnest member being joined.

Provide a minimum lap of 4 in. between the member being joined and the edge of the butt strap, welded on both the inside and outside, unless otherwise approved.

Provide a minimum 6 in. welded outlet for inspecting each closure section, unless the access man way is within 40 ft. of the closure section. Provide forged steel threaded outlets of approved design, where required, for use in passing hose or lead wires into the pipe. Tap plugs with standard pipe threads and weld to the pipe in an approved manner, and use solid forged steel plugs for closure.

Provide full penetration butt or welded joints as shown on the plans. Use flanged joints at valves unless otherwise shown on the plans. Perform x-ray or ultrasonic testing of manual welds on special pipe and fittings.

Dished Head Plugs: Provide dished head plugs (test plugs) to withstand field hydrostatic test pressure from either side of the plug. Ensure the design stress due to hydrostatic pressure is at most 50% of minimum yield. Pipe on the opposite side of the hydrostatic test may or may not contain water. Ensure the manufacturer of the steel pipe hydrostatically tests the plugs at the factory.

Make curves and bends by deflecting joints, by using beveled joints, or by combining these methods, unless otherwise shown on the plans. Do not exceed the joint deflection angle recommended by the pipe manufacturer.

Make penetration of spigot into bell at all points of circumference at least equal to minimum required penetration shown on the plans. Provide beveled pipe sections used in curved alignment of standard length except when shorter sections are required to limit the radius of curvature. In this case, provide equal length sections throughout the curve. Do not allow the bevel to exceed 5°.

- 2.2.6 **Steel Pipe Flanges.** Ensure steel pipe flanges shown on the plans conform to AWWA Standard C207 for Class D Flanges (same diameter and drilling as Class 125 cast-iron flanges ASA B16.1).

Make cast-iron to steel pipe connections with 1 cast-iron bell flange and 1 steel slip-on flange, and ensure they are electrically isolated.

The use of insulating gaskets, plastic bolt sleeves, and washers of insulating gasket material backed with zinc plated or hot-dip galvanized washers, or epoxy coated bolts, nuts, and washers used with an insulating gasket, are approved for this purpose.

For inline flange joints 12 in. in diameter and greater and for butterfly valve flanges, use Pyrex LineBacker Type E phenolic gaskets manufactured by Pipeline Seal and Insulator Inc., or approved equal.

Use full-face gaskets for other flanged joints not listed above. Provide cloth-inserted rubber gasket material, 1/8 in. thick in accordance with AWWA C207. Ensure gaskets are factory-cut to proper dimensions.

Maintain electrically isolated flanged joints between steel and cast-iron by using epoxy coated bolts, nuts, washers, and insulating type gaskets unless, otherwise approved.

Fabricate flanges with oversize bolt holes, with flanges drilled in pairs, to accommodate insulating sleeves.

2.2.7. **Steel Pipe Protective Coatings.**

2.2.7.1. **General.** Use shop-applied protective coatings except for field repairs and coatings of field welded joints. The Engineer may provide for witness of inspection and testing of shop-applied coatings, however, such witness does not relieve the Contractor of the responsibility to furnish material, perform work, and provide quality control in conformance with the applicable AWWA Standard and the requirements of these specifications.

The substrate surface profile and minimum and maximum individual and total dry film thickness (DFT) indicated in this specification apply. No requirement of this specification cancels or supersedes the specific written directions and recommendations of the specific coating manufacturer so as to jeopardize the integrity of the applied system. Measure the dry film thickness in accordance with SSPC PA2.

Field test shop coating and field repairs for holidays, pinholes, or discontinuities, at voltage levels required by the applicable AWWA Standard and in accordance with the applicable NACE procedure, i.e., PRO 188, RPO 274, TMD 384, etc. Submit the test procedure, including voltage levels to be used, before testing. Repair holidays in conformance with the applicable AWWA Standard.

Provide documentation by a NACE-certified inspector of compliance with the required tests.

Handle, store, and use field procedures for shop-coated pipe in conformance with the applicable AWWA Standards. Adequately seal and protect pipe ends from damage during handling and storage. Do not remove such protection until immediately before installing. Do not lift pipe using caliper clamps or hooks at ends of the pipe.

Repair damage to the pipe or the protective coating caused while installing the pipe and before final acceptance by the owner, as directed and in conformance with the applicable standards.

Keep the interior of the pipe and fittings clean of foreign matter before installing and until the work is accepted. Keep joint contact surfaces clean until jointing is complete.

Furnish an affidavit of compliance that all materials and work furnished comply with the requirements of the applicable AWWA Standard and these specifications.

2.2.7.2. **Internal Lining for Steel.** Ensure the material used for the internal coating of the steel carrier pipe is NSF61-listed as suitable for contact with potable water as required by Chapter 290, Rules & Regulations for Public Systems, Texas Commission on Environmental Quality (TCEQ).

Supply steel pipe with epoxy lining, capable of conveying water at temperatures not greater than 140°F. Provide linings conforming to American National Standards Institute/National Sanitation Foundation (ANSI/NFS) Standard 61, and certification from an organization accredited by ANSI. Unless otherwise noted, coat exposed (wetted) steel parts of flanges, blind flanges, bolts, and access manhole covers, with epoxy lining as specified.

2.2.7.2.1

Epoxy Lining. Use Liquid Epoxy meeting the requirements of AWWA C-210, "Liquid Epoxy Coating System for the Interior and Exterior of Steel Water Pipelines," except as modified in this specification. Provide a Liquid Epoxy system consisting of three coats of polyamide epoxy (no coal tar material) as follows:

- Prime Coat: 2-part, chemically cured, NSF certified epoxy, 4-6 mils dry film thickness (DFT).
- Intermediate Coat: 2-part NSF certified epoxy, 4-6 mils (DFT).
- Finish Coat: 2-part NSF certified epoxy, 4-6 mils (DFT).

Ensure the total system has a minimum DFT of 12 mils and a maximum DFT of 18 mils. Apply each coat in contrasting colors, using a buff prime and intermediate coat and a white finish coat. Use the same manufacturer to supply all material. Coal-tar epoxy material is not permitted. For surfaces to be coated, abrasive blast clean them to a near-white finish in accordance with SSPC-5(64) to establish an average anchor profile of 2.0 to 3.0 mils, with no individual reading greater than 4.0 mils or less than 1.5 mils. Before applying, inspect the prepared and cleaned surface for evidence of non-visible contaminants such as soluble salts or chlorides in accordance with NACE Technical Committee Report "Surface Preparation of Contaminated Steel Surfaces," NACE Publication 6G 186.

Re-clean the surface as necessary, until it is free of such contaminants.

Perform an interior adhesion test on pipe 30 in. in diameter and larger in accordance with ASTM D 4541.

Minimum field adhesion: 700 psi. Perform this test on pipe for project at a frequency of one for every 1000 sq. ft. of epoxy lining. Perform a cure test in accordance with ASTM D 4752 (solvent rub test) and ASTM D 3363 (pencil hardness) for each section of pipe. Repair tested areas with approved procedures.

Provide Fusion Bonded Epoxy in accordance with AWWA C-213, "Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines."

2.2.7.3.

External Coating.

2.2.7.3.1.

Above Ground. Externally coat above ground steel piping and fittings with a 3-coat epoxy/epoxy/polyurethane system in accordance with AWWA C-218, "Coating the Exterior of Aboveground Steel Water Pipelines and Fittings," Section 2.5, Coating System No. 4-91, except as modified in this specification.

- Prime Coat: 2-component, inhibitive epoxy primer; DFT of 4-6 mils.
- Intermediate Coat: 2-component, chemical resistant epoxy; DFT of 4-6 mils.
- Finish Coat: 2-component aliphatic polyurethane; DFT 1.5-2.5 mils.

Ensure the total system has a minimum DFT of 9.5 mils and a maximum DFT of 14.5 mils. Apply each coat in contrasting colors, using a buff prime coat and a blue finish coat, or as directed. Use the same manufacturer to supply all material. For surfaces to be coated, abrasive blast clean them to a near-white finish in accordance with SSPC-SP10 (NACE 2) to establish an average anchor profile of 2.0 to 3.0 mils, with no individual reading greater than 4.0 mils or less than 1.5 mils. Before coating, inspect the prepared and cleaned surface for evidence of non-visible contaminants such as soluble salts or chlorides in accordance with NACE Technical committee Report "Surface Preparation of Contaminated Steel Surfaces," NACE Publication 6G 186. Re-clean the surface as necessary, until it is free of such contaminants.

Perform an interior adhesion test on pipe 30 in. in diameter and larger in accordance with ASTM D 4541. Minimum field adhesion: 700 psi. Perform this test on pipe for the project at a frequency of one for every 1000 sq. ft. of epoxy lining. Perform a cure test in accordance with ASTM D 4752 (solvent rub test) and ASTM D 3363 (pencil hardness) for each section of pipe. Repair tested areas with approved procedures.

Provide Fusion Bonded Epoxy in accordance with AWWA C-213, "Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines."

- 2.2.7.3.2. **Buried Steel Pipe, 24 Inch Diameter and Larger Only.** Coat buried steel pipe and fittings (except tunneled, cased, or augered holes) with either of the following systems:
- 2.2.7.3.2.1 **Tape Coating.** Provide an approved tape for external tape coating. Apply in accordance with AWWA C214 and the requirements of this section; 80 mil shop-applied, Polyken YG-III, Tek-Rap Yard-Rap, or approved equal. Components: Primer, one 20 mil layer of inner-layer tape for corrosion protection and two 30 mil layers of outer-layer tape for mechanical protection. Bond coupling to adjacent pipes with bonding cables as shown on the plans.
- Use approved filler putty, type Polyken 939 insulating putty, or approved equal, to fill in the gap and create a smooth sloped transition between the top of the reinforcing plate and the pipe, before applying the tape coating.
- Primer: Compatible with the tape coating, supplied by the coating-system manufacturer.
- Provide pipe with shop coatings cut back approximately 4 to 4-1/2 in. from the joint ends to facilitate joining and welding of pipe. Taper successive tape layers by 1 in. staggers to facilitate field wrapping and welding of joints. Inner and outer tape width: 12 in. or 18 in.
- Do not expose tape coating to direct sunlight for more than 60 days.
- Wrap specials and fittings that cannot be machine wrapped due to configuration, with primer layer and two layers of prefabricated tape, each 35 mils thick. Overlap machine applied tape with hand applied tape by minimum of 2 in. and bind to it.
- Apply Polyken approved 30 mil filler tape 931, or approved equal, parallel to spiral weld seams if weld height measures greater than or equal to 1/8 in.
- 2.2.7.3.2.2. **Polyurethane Coating.** Refer to Section 2.2.7.3.1., "Above Ground." Heat Shrink Joint Sleeves for Tape Coating: Aqua-shield, or approved equal. For repairs to heat shrink joint sleeves, use Aqua-shield Repair Patch Kit, or approved equal.
- 2.2.7.3.3. **Steel Pipe in Tunneled, Cased, Bored, or Augered Holes.**
- 2.2.7.3.3.1. **24 Inch and Larger:** Prime steel pipe in tunneled or cased holes with 3.0 to 4.0 mils of a 2-part chemically cured rust inhibitive polyamide epoxy. Prepare the surface the same as for above ground external coating in accordance with Section 2.2.7.3.1., "Above Ground." Fill the annular space between the tunnel or casing with the specified grout.
- 2.2.7.3.3.2. **20 Inch and Smaller:** Coat steel pipe in bored or augered holes, or holes in a tunnel or casing, with Corropipe II-TX or Corroclad 2000 as manufactured by Madison Chemical Industries, Inc., or approved equal, and apply in strict conformance with the manufacturer's recommendations.
- For external field welds and other field repairs, use Madison Chemical "GP" II or "TX" Touch Up, or approved equal, in conformance with the manufacturer's recommendations.
- 2.2.7.4. **Inspections and Testing of Coatings.** Perform electrical inspection on the inner layer of tape before applying the intermediate layer of tape. If holidays are detected, repair holidays immediately before applying the outer layer of tape. Clear the holiday area of material and re-prime if necessary. Re-coat the area with inner wrap tape. Overlap the inner wrap tape onto the surrounding inner wrap coating by at least 2 in. Perform an electrical re-test at the repaired area after repairing the holiday, and before continuing the outer wrap.
- Shrink Wrap: Perform an electrical inspection on the shrink wrap to check for holidays. Perform peel tests over the heat affected zone. Minimum acceptable result: 15 lbs. ft. per inch.
- 2.3. **Ductile-Iron Pipe and Fittings.**

2.3.1

Ductile-Iron Pipe. Provide ductile-iron pipe conforming to the requirements of AWWA Standard C151. Provide minimum lengths of 18 ft. and minimum thickness of Class 51 for water lines. Provide minimum thickness Class 53 for flanged pipe and minimum thickness Class 52 for areas with pipe offset sections. Use joints of the push-on type or flanged type unless otherwise shown on the plans. Use push-on joints conforming to the requirements of ASA Specification A21.11 (AWWA C111). Use flanged joints conforming to the requirements of AWWA C115 including a cloth inserted rubber gasket material 1/8 in. thick for flanged joints. Do not use threaded or grooved type joints which reduce the pipe wall thickness below the minimum required.

Provide polyethylene encasement material and install in accordance with AWWA C105, and backfill as specified. Apply a minimum of two complete wraps of 8 mil thick polyethylene. Use polyethylene encasement for open cut installations only. For augered sections or sections installed inside a tunnel or casing, provide polyurethane coating.

Ensure the pipe manufacturer performs hydrostatic testing in accordance with AWWA C 151, Section 5.2.1, at the point of manufacture, conducts the test for a minimum of 2 min. and thoroughly inspects the pipe.

Repair or reject pipe revealing leaks or cracks. Obtain from the manufacturer and submit to the Engineer, the manufacturer's written certification that the pipe and fittings used on this project have passed the hydrostatic test.

Prevent any lateral movement of thrust restraints throughout the pressure testing and operation. Passive resistance of soil will not be permitted in the calculation of thrust restraint.

Clearly mark the pipe section to show the location and thickness or pressure class color code.

Provide an exterior coating, in open cut excavations, consisting of a prime coat and an outside asphaltic coating conforming to AWWA C110, C115, or C151 for pipe and fittings. Encase the water line in a double wrap of polyethylene. Use polyethylene wrap conforming to the requirements of Section 2.13., "Polyethylene Film Wrap," and Section 3.16., "Polyethylene Film Wrap." Install bond wire as specified.

Coat Ductile-Iron pipe in augered holes with a polyurethane coating. Use a polyurethane coating conforming to the same requirements as those in Section 2.2.7.3.3., "Steel Pipe in Tunneled, Cased, Bored, or Augered Holes."

2.3.2

Fittings for Ductile-Iron Pipe. Ensure fittings for use with ductile-iron pipe of nominal sizes 4 in. through 48 in. conform to AWWA Standard C110 or C153.

Use joints of the push-on type or flanged type unless otherwise shown on the plans. Use push-on joints conforming to the requirements of ANSI Specification A21.11 (AWWA C111), rated for a 250 psig working pressure or A21.53 (AWWA C153). Use flanged fittings conforming to AWWA C110, of cast or ductile iron and conforming to ANSI B16.1, class 125 rated at 250 psig working pressure. Screw flanged fittings on threaded pipe ends done in the shop in accordance AWWA C115 for attaching, aligning, and facing.

Coat the inside and outside surfaces of the fittings as specified for the regular lengths of ductile-iron pipe.

Regardless of the coating system, for flanged joints in buried service, provide a petrolatum wrapping system, Denso, or approved equal, for the complete joint and alloy steel fasteners. Alternatively, provide bolts made of Type 304 stainless steel.

Bond joints in accordance with Section 2.6., "Joint Bonding and Electrical Insulation."

2.3.3.

Restrained Joints. For buried services, restrain ductile iron pipe 16 in. diameter and larger from movement, using special joints. Provide the following or approved equal:

- Super-Lock Joint by Clow Corporation.

- Flex-Ring or Lok-Ring by American Cast Iron Pipe Company.
- TR-Flex or Field-Lok Joint by U.S. Pipe and Foundry Company.

Provide restrained joints with enough distance from each side of the bend, tee, plug, or other fitting to resist thrust developed at the design pressure for the pipe.

Use water main interior coatings conforming to AWWA C104 or ANSI A21.4, cement-lined with seal coat or ANSI A 21.16 fusion-bonded epoxy coating.

Ensure the material used for internal coating is NSF 61 and listed as suitable for contact with potable water as required by Chapter 290, Rules and Regulation for Public Water Systems, Texas Natural Resources Conservation Commission (TNRCC).

2.4. **Polyvinyl Chloride Pipe (PVC) Pipe and Fittings.**

2.4.1. **Polyvinyl Chloride Pipe, 2 Inch through 20 Inch.** Provide PVC pipe 4 in. and larger with integral bell type gasketed push-on joints or plain end pipe with twin-gasketed couplings conforming to the requirements of ASTM Designation D3139 for push-on-type joints. Use rubber gaskets conforming to the requirements of ASTM Designation D1869. Lubricate gaskets with a nontoxic water-soluble lubricant before joining pipe units. Fit pipe units together in such a manner to avoid twisting or damaging the rubber gasket.

Mark furnished PVC pipe on the spigot end for proper depth of makeup to the bell end of a joining length of pipe or fitting.

Provide valves for use with PVC pipe conforming to the requirements of Section 2.9., "Gate Valves, Tapping Valves, and Tapping Sleeves," except provide valve ends of the push-on-joint type for use with PVC pipe. Provide self-extinguishing PVC pipe that bears Underwriters' Laboratories mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines. Ensure PVC pipe bears the National Sanitation Foundation Seal of Approval (NSF-PW).

Provide PVC meeting the following thickness when using restrained joints:

- DR 18: For restrained joints where shown in the plans.
- DR 14: For alternate to offset pipe sections shown on the plans. Do not use PVC pipe for offset sections with depth cover greater than 20 ft. or less than 4 ft. Do not use PVC pipe in potentially petroleum-contaminated areas.

Make curves and bends by deflecting joints. Do not exceed the maximum deflection recommended by the pipe manufacturer. Submit details of other methods of providing curves and bends for review by the Engineer.

Gaskets: Use gaskets meeting the requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight. Flat Face Mating Flange: Full faces 1/8 in. thick ethylene propylene rubber (EPR). Raised Face Mating Flange: Flat ring 1/8 in. EPR, with filler gasket between the outside diameter (OD) of the raised face and the flange OD to protect the flange from the bolting moment. Lubricant for rubber-gasketed joints: Water-soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, and causing no deteriorating effect on PVC or rubber gaskets. Use one manufacturer to furnish PVC pipe. When an approved PVC system is used as alternate to offset pipe section, a second manufacturer may be used. Do not use PVC pipe in potentially or known contaminated areas. Do not use PVC pipe in areas exposed to direct sunlight.

Ensure the pipe manufacturer performs hydrostatic testing accordance with AWWA C 900, AWWA C 905, AWWA C 909, and ANSI A 21.10 (AWWA C 110) at the point of manufacture. Obtain from the manufacturer and submit to the Engineer, the manufacturer's written certification that the pipe and fittings used on this project have passed the hydrostatic test.

- 2.4.2. **Fittings for Polyvinyl Chloride Pipe, 2 Inch.** Provide PVC pipe manufactured in accordance with the requirements of ASTM Designation D1784 for PVC 12454B (Type I, Grade 1) or PVC 12454C (Type I, Grade 1) and with a standard thermoplastic pipe dimension ratio (SDR) equal to 21.
- Use fittings for 2 in. PVC pipe with a minimum pressure rating of 200 psi. Use fittings of the solvent-weld, socket type conforming to the requirements of ASTM D2466, or the gasketed push-on type conforming to the requirements of ASTM D2241. Use PVC solvent cements manufactured in accordance with ASTM D2564.
- 2.4.3. **Polyvinyl Chloride Pipe, 4 Inch Through 20 Inch.** PVC pipe 4 in. through 12 in.: AWWA C 900, AWWA C 909, Class 150, DR 18; AWWA C 900, Class 200, DR 14 as alternate to offset pipe sections; nominal 20 ft. lengths; cast-iron equivalent outside diameters. Pipe 14 in. through 20 in.: AWWA C 905; Class 235; DR 18; nominal 20 ft. lengths; cast-iron equivalent outside diameter.
- Use joints conforming to the same requirements as those specified for 2 in. PVC pipe.
- 2.4.4. **Bends and Fittings for PVC Pipe, 4 Inch through 20 Inch.** Provide fittings conforming to the requirements of Section 2.3.2., "Fittings for Ductile-Iron Pipe." Use polyethylene wrapped fittings as required by Section 2.13., "Polyethylene Film Wrap," and Section 3.16., "Polyethylene Film Wrap."
- Provide restrained joints with enough distance from each side of the bend, tee, plug, or other fitting to resist thrust developed at the design pressure for the pipe.
- Approved Certa-Lok PVC restrained joints, 200-250 psi, may be provided for up to 12 in. in diameter. Where preventing movements of 12 in. diameter or greater pipe due to thrusts is necessary, provide the following restrained joints, or approved equal:
- 2.4.4.1. **Fittings.** JCM 610 Sur-Grip Fitting Restrainer by JCM Industries, Inc. or Series 500 Fitting Restrainer by Ebba Iron, Inc., One Bolt by One Bolt, Inc., or approved equal.
- 2.4.4.2. **Bell and Spigot.** JCM 620 or 621 Sur-Grip Bell Joint Restrainer by JCM Industries, Inc. or Series 1500 or Series 1100HV Joint Restrainer by Ebba Iron, Inc., One Bolt by One Bolt, Inc., or approved equal.
- 2.4.5. **Nonmetallic Pipe Detection.** Where nonmetallic pipe is installed longitudinally underground, provide for a method of detecting the location of the nonmetallic pipe. The specific method is shown on the plans or will be approved. This system may involve some components to be installed in the trench around the pipe to be detected using a metal detector. Or the system may consist of locating equipment capable of creating a non-destructive pressure wave which can be detected above ground using a portable detection device with both audible and visual indicators. Ensure either system of detection is capable of accurately locating the pipe to a maximum depth of 3 ft. over the areas shown on the plans.
- Either system must be capable of locating lines under earth, concrete, or asphaltic surfaces. Use equipment, materials, and installation as specified by the manufacturer.
- 2.5. **Fiberglass Reinforced Plastic (FRP) Pipe for Casing.**
- 2.5.1. **FRP Casing Pipe.** Ensure pipe used for casing is centrifugally cast fiberglass pipe conforming to the requirements of AWWA Standard C 950 and the requirements of this section.
- Design fiberglass casing pipe wall thickness to withstand the most critical simultaneous application of external loads, including construction loads and internal pressures. Base the design on the minimum of AASHTO HS-20 loading, AREMA E-80 loads, and depths of bury as indicated on the plans. Design for the most critical groundwater level condition. The pipe design conditions follow:
- 2.7.1.1 Working Pressure = 100 psi**
- Hydrostatic Field Test Pressure = 150 psi
- Provide the pipe with pressure rated fiberglass sleeve couplings or O-ring bell-and-spigot joints that use elastomeric sealing gaskets to maintain joint water-tightness conforming to the requirements of ASTM D

4161. Provide the casing end treatments with rubber boot type seals capable of maintaining casing water-tightness. Provide casing pipe, gasketing and end treatments that have a very-low to zero corrosive reaction to the chemicals listed on the pipeline product lines shown in the plans. The pipeline products encountered at proposed water line crossings include, but are not limited to:

- MTBE (Methyl Tertiary Butyl Ether)
- TBA (tertiary butyl arsine)
- Nitrogen
- Benzene
- Petroleum
- Natural Gas
- Ethane

Provide pipe manufactured with an epoxy vinyl ester resin with the physical and chemical properties of HETRON 970-35 by Ashland, or approved equal.

Provide fiberglass casing sections in nominal lengths of 20 ft. Provide a stiffness class of fiberglass pipe that satisfies design requirements, but not less than 46 psi, when used in direct bury operation. For tunneled and augered sections, use pipe and pipe joints designed to carry loads including but not limited to: Overburden and lateral earth pressures, subsurface soil, grouting, other conditions of service, thrust of jacks, and stress anticipated during handling and installation. Do not create grout holes with pipe.

Submit shop drawings signed and sealed by a Professional Engineer licensed in State of Texas showing following:

- Manufacturer's pipe design calculations including thrust restraint design.
- Details of pictorial nature of critical features and specials indicating alignment and grade, laying dimensions, fabrication, fitting, flange, and fully dimensioned details, with plan view detailing pipe invert elevations, bends, and other critical features. Indicate station numbers for fittings corresponding to the e plans. Do not start production of pipe and fittings before review and approval by Engineer. Provide final approved lay schedule on CD-ROM in Adobe Portable Document Format (*.PDF).
- Certification from manufacturer that design was performed for the project in accordance with the requirements of this section. This Certification is to be signed and sealed by Professional Engineer licensed in the State of Texas.
- Gasket and resin selection for approval.

2.6. **Joint Bonding and Electrical Insulation.** For electrical bond wires, use a minimum No. 2 AWG, 7 strand, and copper cable, furnished with high molecular weight polyethylene insulation (HMWPE). Remove 1 in. of HMWPE insulation from each end of the bond wire. Provide 2 bond wires as shown on the plans.

Provide a flange adaptor with an insulating kit, as required, when connecting new piping to existing piping and piping of different materials. Provide electrical flange insulation through the installation of the following materials:

2.6.1. **Insulating Gasket.**

2.6.1.1. **Piping Sized 30 Inches in Diameter and Greater.** Provide Pyrox G-10 with nitrile seal, Type E LineBacker gasket as manufactured by Pipeline Seal and Insulator, Inc. or approved equal.

2.6.1.2. **Piping Sized Between 12 Inches and 24 Inches in Diameter.** Provide Phenolic PSI with nitrile seal, Type E LineBacker gasket as manufactured by Pipeline Seal and Insulator, Inc., or approved equal.

The Contractor may provide a plain-faced phenolic gasket, as manufactured by Pipeline Seal and Insulator, Inc., or approved equal. Place the phenolic gasket between two full-faced gaskets. Provide

cloth-inserted rubber gasket material, 1/8 in. thick in accordance with AWWA C207. Use gaskets that are factory cut to proper dimensions.

2.6.2. **Sleeves and Washers.**

2.6.2.1. **Piping Sized 30 Inches in Diameter and Greater.** Provide full length Mylar sleeves with Pyrox G-10 washers, double washer sets as manufactured by Pipeline Seal and Insulator Inc., or equal.

2.6.2.2. **Piping Sized Between 12 Inches and 24 Inches in Diameter.** Provide full length Mylar sleeves with phenolic washers, double washer sets as manufactured by Pipeline Seal and Insulator, Inc. or approved equal.

2.7. **Copper Tubing for Copper Service Lines and Small Mains.** For 3/4 in., 1 in., 1-1/2 in., and 2 in. diameter copper tubing for underground service, use Type "K" soft annealed and seamless with the proper bending temper and conforming to ASTM Designation B88 and Federal Specification WW-T-799 with the following exceptions:

Section 14 of ASTM Designation B88 is hereby modified to provide for the following number of samples for each size of tubing:

- For each 7,500 ft. of tubing 1 sample
- Items of less than 7,500 ft. of tubing 1 sample

Furnish 3/4 in. and 1 in. tubes in 60 ft. coils. Furnish 1-1/2 in. and 2 in. tubes in coils of minimum 40 ft. length. Use minimum joint spacing in multiples of 60 ft. or 40 ft. respectively

Provide flared or compression-type brass fittings for use with Type K annealed copper tubing in accordance with AWWA C800.

2.8. **Brass Fittings for Underground Services Lines and Small Mains (Less Than 24 inch Diameter).**

2.8.1. **General.** Unless otherwise provided in this specification, use brass fittings in underground installations of service lines and small mains in the water distribution system.

Use brass fittings composed of Copper Alloy No. C 83600 conforming to the requirements of ASTM Designation B62. Ensure the general pattern for each fitting conforms to that of standard brass fittings as manufactured by Mueller Company, Hays Manufacturing Company, or an approved equal.

Compression fittings may be used for unions except where they occur under existing or future paving. Use compression tube fittings with Buna-N beveled gaskets.

Ensure each fitting has the manufacturer's name or trademark and size plainly stamped into or cast on the body. Provide straight pipe adjacent to fittings for at least 10 in.

Provide waterways no smaller in diameter than the nominal size of the stop and accurately finish to a watertight joint; face all nuts and washers to a true fit; and design them such that the joint remains watertight and reasonably easy to operate after repeated use over a number of years. Use external threads conforming to AWWA Standard C800 and, on corporation stops, protect them in shipment by using plastic coatings or an alternate approved method.

2.8.2. **Corporation Stops.** Provide inlet ends of one of the following types: Standard corporation stop threads as specified in Table 1, AWWA C800; iron pipe thread (permissible for use with service saddles only); or Hays 4200-4202 or approved equal.

Use one of the following types of valve body: Tapered plug type; O-ring seat ball type; or the rubber seat ball type.

Provide outlet ends with a flared-copper connection for use with Type-K soft copper or compression type fitting.

For PVC pipe, provide all brass corporation stops specifically designed for use with PVC pipe.

- 2.8.3. **Curb Stops.** Provide inlet ends with flared copper connections or compression type fittings.

Use a valve body with a straight through or angled meter stop design equipped with padlock wings and of the O-ring seal straight plug type or the rubber seat ball type.

Provide the outlet with female iron pipe threads or swivel nut meter spud threads, 3/4 in. and 1 in. stops, and with 2-hole flanges for 1-1/2 in. and 2 in. sizes.

- 2.8.4. **Service Saddles.** Provide service saddle with dual straps and one of the following types: Brass body and straps; ductile-iron body and straps, vinyl coated; ductile-iron body, vinyl coated with stainless steel straps.

Taps for PVC Water Mains: Use dual strap or single, wide band strap saddles which provide full support around the circumference of the pipe and a bearing area with enough width along the axis of the pipe, 2 in. minimum, to ensure that the pipe will not be distorted when the saddle is tightened. Use Romac Series 101N wide band, stainless-steel tapping saddle with AWWA standard thread (Mueller thread), or approved equal.

- 2.8.5. **Angle Stops.** Provide angle stops in accordance with AWWA C800; ground-key stop type with bronze lock-wing head stop cap; inlet and outlet threads conforming to the application tables of AWWA C800; and inlet side with a flared connection or Mueller 110 compression type, or an approved equal.

- 2.8.5.1. **Outlet for 3/4 Inch and 1 Inch Size.** Provide meter swivel nut with saddle support.

- 2.8.5.2. **Outlet for 1-1/2 Inch through 2 Inch Size.** Provide O-ring sealed meter flange, iron pipe threads.

- 2.8.6. **Fittings.** Provide fittings in accordance with AWWA C800 and as described below:

- 2.8.6.1. **Castings.** Smooth, free from burrs, scales, blister, sand holes, and defects which would make them unfit for their intended use.

- 2.8.6.2. **Nuts.** Smooth cast and with symmetrical hexagonal wrench flats.

- 2.8.6.3. **Flare-joint Fittings.** Smooth cast. Machine seating surfaces for metal-to-metal seal, to proper taper or curve, free from any pits or protrusions.

- 2.8.6.4. **Thread Fittings.** Use N.P.T. threads and protect male threaded ends in shipment by using plastic coatings or other equally satisfactory means.

- 2.8.6.5. **Compression Tube Fittings.** Provide with a Buna-N beveled gasket.

Brass fittings will require the following testing:

- Submerge in water for 10 sec. at 85 psi with stops in both closed and open positions.
- Reject any fittings that show air leakage. The Department may confirm tests locally. An entire lot from which samples were taken will be rejected when random sampling discloses unsatisfactory fittings.

- 2.9. **Gate Valves, Tapping Valves, and Tapping Sleeves.**

- 2.9.1. **Gate Valves.** Use gate valves conforming to AWWA Standard C500, C509, C515, and the following supplemental specifications:

Provide direct-bury valves and valves in subsurface vaults that open clockwise. Provide above-ground valves that open counter-clockwise.

If the type of valve is not indicated on the plans, use gate valves as line valves for sizes less than 20 in. If the type of valve is specified, no substitute will be allowed.

Use a valve body of straight-through or angled, meter-stop design equipped with the following:

- O-Ring Seal – straight plug type.
- Rubber Seat – ball type

Provide the outlet end with female, iron-pipe threads or swivel-nut, meter-spud threads on 3/4 in. and 1 in. stops; and with a 2-hole flange on 1-1/2 in. and 2 in. sizes.

Where installing at depths greater than 4 ft., provide gate valves with a non-rising, extension stem with a coupling able to attach securely to the operating nut of the valve. Terminate the upper end of the extension stem in a square wrench nut no deeper than 4 ft. from the finished grade. Support the extension stem with an arm attached to the wall of the manhole or structure that loosely holds the extension stem and allows rotation in the axial direction only.

Provide gate valves in factory mutual type meter installations conforming to the provisions of this specification with outside screw and yoke valves, and carrying the label of Underwriter's Laboratories, Inc.

Provide coatings in accordance with AWWA C550; Indurall 3300 or approved equal, that are non-toxic; do not impart taste to water; function as a physical, chemical, and electrical barrier between base the metal and surroundings; and are a minimum 12 mil thick fusion-bonded epoxy. Before assembling the valve, apply the protective coating to the interior and exterior surfaces of the body.

Provide flange joints when the valve is connected to steel pipe.

Mount valves horizontally if the proper ground clearance cannot be achieved by a normal vertical installation. For horizontally mounted gate valves, provide bevel operation gear that is mounted vertically, for above ground operation.

- 2.9.1.1. **Gate Valves 1-1/2 Inches in Diameter and Smaller.** Use an operating pressure of 125 psi; bronze mounting; rising-stem; single-wedge; disc type; screwed ends; Crane No. 428, or approved equal.
- 2.9.1.2. **Gate Valves 2 Inches in Diameter.** Use an iron body; double gate; non-rising stem; 150 lb. test; 2 in. square nut operating clockwise to open.
- 2.9.1.3. **Gate Valves 4 Inches to 12 Inches in Diameter.** Non-directional; standard-wall resilient-seated in accordance with AWWA C509, parallel seat double disc in accordance with AWWA C500, or reduced-wall resilient-seated gate valves AWWA C515; operating pressure of 200 psi; pressure rating bronze mounting; push-on bell ends with rubber joint rings and nut-operated unless otherwise specified; resilient-seated provided by American Darling AFC-500, US Pipe Metro Seal 200, or approved equal; Reduced-wall resilient seated valves by American Flow Control Series 2500, or approved equal; double disc provided by American Darling 52, Clow F-6102, or approved equal; and comply with following unless otherwise shown on the plans:
- 2.9.1.3.1. **Design.** Fully encapsulated rubber wedge or rubber seat ring mechanically attached with minimum 304 stainless steel fasteners or screws; threaded connection isolated from water by compressed rubber around opening.
- 2.9.1.3.2. **Body.** Cast or ductile iron; flange bonnet and stuffing box together with ASTM A307 Grade B bolts. Cast the manufacturer's initials, pressure rating, and year manufactured into the valve body.
- 2.9.1.3.3. **Bronze.** Ensure that the valve components in the waterway contain at most 15% zinc and at most 2% aluminum.

- 2.9.1.3.4. **Stems.** ASTM B763 bronze, alloy number 995 minimum yield strength of 40,000 psi; minimum elongation in 2 in. of 12%; non-rising.
- 2.9.1.3.5. **O-rings.** For AWWA C509, Sections 2.2.6 and 4.8.2. For AWWA C500, Section 3.12.2. For AWWA C515, Section 4.2.2.5.
- 2.9.1.3.6. **Stem Seals.** Consist of 3 O-rings, 2 above and 1 below the thrust collar, with an anti-friction washer located above the thrust collar.
- 2.9.1.3.7. **Stem Nut.** Independent or integrally cast of ASTM B62 bronze.
- 2.9.1.3.8. **Resilient Wedge.** Molded; synthetic rubber; vulcanized and bonded to cast-iron or ductile-iron wedge tested to meet or exceed ASTM D429 Method B; or attached with 304 stainless steel screws; seat against epoxy-coated surface in the valve body.
- 2.9.1.3.9. **Bolts.** Furnish in accordance with AWWA C509 Section 2.2.5, AWWA C500 Section 3.4, or AWWA C515 Section 4.4.4 stainless steel; cadmium-plated, or zinc-coated.
- 2.9.1.4. **Gate Valves 14 Inches and Larger in Diameter.** AWWA C500; parallel seat double disc, or AWWA C515; reduced-wall, resilient-seated gate valves; flanged ends and nut-operated unless otherwise specified. Provide reduced-wall resilient-seated valves with 250 psig pressure rating and manufactured by American Flow Control Series 2500, or approved equal. Provide double disc valves with 150 psig pressure rating and manufactured by American Darling 52, Clow F-6102, or approved equal. Comply with following requirements unless otherwise shown on the plans.
- 2.9.1.4.1. **Body.** Cast iron or ductile iron; flange together bonnet and stuffing box with ASTM A 307 Grade B bolts. Cast the following into the valve body: manufacturer's initials, pressure rating, and year manufactured. When mounting horizontally, equip valves greater in diameter than 12 in. with rollers, tracks, and scrapers.
- 2.9.1.4.2. **O-rings.** For AWWA C500, Section 3.12.2. For AWWA C515, Section 4.2.2.5.
- 2.9.1.4.3. **Stems.** ASTM B 763 bronze, alloy number 995 minimum yield strength of 40,000 psi; minimum elongation in 2 in. of 12%, non-rising.
- 2.9.1.4.4. **Stem Nuts.** Machined from ASTM B 62 bronze rod with integral forged thrust collar machined to size; non-rising.
- 2.9.1.4.5. **Stem Seals.** Consist of 3 O-rings, 2 above and 1 below the thrust collar, with an anti-friction washer located above the thrust collar for operating torque.
- 2.9.1.4.6. **Bolts.** AWWA C500 Section 3.4 or AWWA C515 Section 4.4.4; stainless steel: cadmium-plated, or zinc-coated.
- 2.9.1.4.7. **Discs.** Cast iron with bronze disc rings securely pinned into machined dovetailed grooves.
- 2.9.1.4.8. **Wedging Device.** Solid bronze or cast-iron, bronze-mounted wedges. Thin plates or shapes integrally cast into cast-iron surfaces are acceptable. Provide other moving surfaces integral to wedging action that are bronze monel or nickel alloy-to-iron.
- 2.9.1.4.9. **Gear Cases.** Cast iron; furnished on 18 in. and larger valves and of extended type with steel side plates; lubricated; gear case enclosed with oil seal or O-rings at shaft openings.
- 2.9.1.4.10. **Bronze Mounting.** Built as integral unit mounted over, or supported on, cast-iron base and of sufficient dimensions to be structurally sound and adequate for imposed forces.
- 2.9.1.4.11. **Stuffing Boxes.** Located on the top of the bonnet and outside the gear case.

Provide a bypass for double-disc gate valves 24 in. and larger.

- 2.9.1.5. **Gate Valves 14 Inches to 36 Inches in Diameter.** Provide AWWA C515, reduce-wall, resilient-seated gate valves with 250 psi pressure rating. Furnish with spur or bevel gearings.

Mount valves horizontally if proper ground clearance cannot be achieved by normal vertical installation. For horizontally mounted gate valves, provide bevel operation gear mounted vertically for above ground operation.

Use valve body, bonnet, wedge, and operator nut constructed of ductile-iron.

Fully encapsulate the exterior of the ductile-iron wedge with rubber. Ensure the wedge is symmetrical and seals equally well with flow in either direction.

Bolts: AWWA C515, Section 4.4.4, stainless steel; cadmium-plated or zinc-coated. Provide high-strength bronze stem and nut.

O-rings: AWWA C515, Section 4.2.2.5, pressure O-rings as gaskets. Provide stem sealed by 3 O-rings. The top 2 O-rings are to be replaceable with the valve fully open at the full rated working pressure. Provide thrust washers for the thrust collar for easy valve operation.

- 2.9.2. **Tapping Valves.** Provide double disc or resilient wedge type tapping valves meeting the requirements of gate valves, as listed above, except for the type of joints; inlet flanges meeting AWWA C110, Class 125 or meeting AWWA C110, Class 150 or higher and with a minimum eight-hole flange. Provide outlets with standard mechanical or push-on type joints that fit any standard tapping machine.

Provide a valve seat opening such that a full-size shell cutter for the nominal size tap may pass through the valve without any contact with the valve body.

Provide valve boxes conforming to the requirements of Section 2.11., "Valve Boxes."

- 2.9.3. **Tapping Sleeves.** Provide tapping sleeve bodies in accordance with AWWA C110 ductile-iron; or AWWA C111 carbon steel; in 2 sections to be bolted together with high-strength, corrosion-resistant, low-alloy, steel bolts, and with mechanical joint ends.

Provide flanged branch outlets of tapping sleeves; machined recess in accordance AWWA C207 Class D, ANSI 150 lb. drilling. Ensure the gasket is affixed around the recess of the tap opening to preclude rolling or binding during installation.

Provide tapping sleeves with a 3/4 in. NPT test opening for testing before tapping. Provide a 3/4 in. bronze plug for the opening.

- 2.9.3.1. **Steel Sleeves.** Do not use steel sleeves for taps greater than 75% of the pipe diameter.

Use steel sleeves only on pipe diameters 6 in. and larger. No "size-on-size" sleeve will be permitted (i.e., 6 in. x 6 in., etc.). To accomplish size-on-size connections, the next smaller tap may be made and a LEB (large end bell) increaser used. Where fire service from a 6 in. main is approved, only a ductile-iron split sleeve is permitted.

Provide a body of heavy welded steel construction. Groove the top half of the body to permanently retain a neoprene O-ring seal against the outside diameter of the pipe.

Provide fusion-bonded steel sleeves, epoxy-coated to a minimum 12 mil thickness. Ensure the finished epoxy coat is free of laminations and blisters; does not peel; remains pliant and resistant to impact. Ship steel sleeves in wooden crates that protect the epoxy coating during transport and storage.

Use bolts and nuts conforming to AWWA Standard C500, Section 3.5, and coated with a 100% vinyl resin (or made of corrosion resistant material).

Steel Tapping Sleeves: Use Smith Blair No. 622, Rockwell No. 623, JCM No. 412, or approved equal.

2.9.4. **Air Release and Vacuum Relief Valves.**

2.9.4.1. **Combination Air Valves.** Provide where combination air valves are designed to fulfill the functions of air release, permitting the air accumulated in the line at the high point of elevation to escape while the line is under pressure, and vacuum relief. Valve exterior: Paint with shop-applied primer suitable for contact with potable water. Provide Apco Model 145C or 147C, Val-matic Series 200, or approved equal valves as shown on the plans.

2.9.4.2. **Air Release Valves.** Provide with flanged inlet and outlet connections as specified on the plans. For 2 in. and 3 in. single body valves, size the orifice for a 100 psi working pressure. Fabricate the air relief valve of materials as follows: body and cover, ASTM A 48, Class 30 cast-iron; float and leverage mechanism, ASTM A 240 or A 276 stainless steel; orifice and seat, stainless steel against Buna-N or Viton mechanically retained with hex head nut and bolt. Other valve internals: stainless steel or bronze.

2.9.4.3. **Air Release and Vacuum Valves.** Provide single-body standard combination or duplex-body custom combination valves as shown on the plans.

2.9.4.3.1. **2 Inch and 3 Inch Single-body Valves.** Provide inlet and outlet sizes as shown on the plans and an orifice sized for a 100 psi working pressure. Valve materials: Body, cover, and baffle, ASTM A48, Class 35, or ASTM A126, Grade B cast iron; plug or poppet, ASTM A276 stainless steel; float, ASTM A240 stainless steel; seat, Buna-N; other valve internals, stainless steel. Paint valve exterior with an epoxy shop-applied primer. Provide Apco Model 145C or 147C, Val-Matic Series 200, or approved equal.

2.9.4.3.2. **3 Inch and Larger Duplex-body Valves.** As shown on the plans, provide an Apco Series 1700 with a No. 200 air release valve, GA Industries Fig. No. AR/GH-21K/280, or approved equal.

Air and vacuum valve materials: Body and cover, ASTM A48, Class 35, cast iron; float, ASTM A240 stainless steel; seat, Type-304, stainless steel and Buna-N; other valve internals, stainless steel or bronze. Air release valve: Construct as specified in Section 2.9.4.2., "Air Release Valves."

2.9.5. **External Coating Above Ground Valves.** Coat valves with a polyurethane coating conforming to the same requirements under Section 2.2.7.3.2.2, "Polyurethane Coating."

2.10. **Butterfly Valves.** Provide butterfly valves and operators conforming to the requirements of AWWA Standard C504 Class 150B, except as modified or supplemented in this specification. Provide short-body valves with a flanged design for closing against a flow velocity of 16 ft. per sec. at a normal working pressure of 150 psi and with a downstream pressure of 0 psi (Class 150B).

Provide direct-bury valves and valves in subsurface vaults that open clockwise. Provide above-ground and plant valves that open counter-clockwise.

Body: Cast iron, ASTM 126, Class B.

Discs for Butterfly Valves: Either cast-iron or ductile-iron.

Provide valves with Buna-N or neoprene seats mounted either on the disc or in the body. Mechanically secure the seats, not relying solely on adhesive properties of epoxy or similar bonding agents to attach the seats to the body. Mechanically retain the seats on the disc by using stainless steel (18-8) retaining rings held in place by stainless steel (18-8) cap screws that pass through a rubber seat for added retention. When the seat is on the disc, retain the seat in position by using shoulders located on both the disc and the stainless-steel retaining ring. Provide mating surfaces for seats of Type 304 or Type 316 stainless steel, secured to the disc by mechanical means. Sprayed on or plated mating surfaces will not

be allowed. Provide a cast-iron disc conforming to ASTM A126, Class B or ductile-iron conforming to AWWA C151. The seat must be replaceable in the field for valves greater than 30 in. in diameter. Valves with segmented retaining rings will not be accepted.

Coat interior wetted ferrous surfaces of the valve, including the disc, with epoxy suitable for potable water conditions. Furnish epoxy, perform surface preparation, and apply epoxy in accordance with AWWA C550 and the coating manufacturer's recommendations. Provide 3 coats of 2-component, high-build epoxy with a minimum dry thickness of 12 mils. Use Indurall 3300, or approved equal, epoxy coating. Holiday test and measure the coatings for thickness.

Use Type 304 or Type 316 stainless steel for the valve shaft and keys, 24 in. in diameter and greater, that require a minimum of 2 in., or taper pins used for attaching the valve shaft to the valve disc. Do not use a torque plug to attach the valve shaft to the valve disc. All portions of shaft bearings: Stainless steel, bronze, nylon, or Teflon (supported by fiberglass mat or backing material with a proven record of preventing Teflon flow under load) in accordance with AWWA C504, stainless steel bearing material. Design the valve shaft to withstand 3 times amount of torque necessary to the open the valve.

Packing: Field-adjustable, split-V type, and replaceable without removing the operator assembly.

Retaining hardware for seats: Type 304 or Type 316 stainless steel. Nuts and screws used with clamps and discs for rubber seats: Securely held with lock tight, or other approved method, from loosening by vibration or cavitation effects.

Seat the valve disc in a position 90° to the pipe axis and ensure it rotates 90° between the fully-opened and tightly-closed position. Install valves with valve shafts horizontal and the convex side of the disc facing the anticipated direction of flow, except where shown otherwise on the plans.

Use push-on or flanged (flanged valves coupled to Bell-Flange adapters may be used) joint types for installation with cast-iron or ductile-iron pipe. Use flanges conforming in dimensions and drilling to ANSI B16.1 for cast-iron body valves, Class 125. Use bolts conforming to AWWA Standard C500, Section 9, in valve installations, including bolts for operators, housing, etc. Use flanged joints for steel or concrete steel cylinder pipes.

Provide properly sized gear type actuators for valves 8 in. and larger. Provide fully enclosed and traveling-nut type, rack and pinion type, or worm-gear type gear actuators. Equip direct-bury valves with a 2 in. square nut operating clockwise to open the valve. Completely enclose the space between the actuator housing and the valve body. Ensure that no moving parts are exposed to the soil or elements. Provide oil-tight and water-tight actuators, factory packed with suitable grease. Use operators conforming to the requirements of AWWA Standard C504 and equipped with adjustable limit stop devices.

Design worm-gear and traveling-nut operators so a torque of 150 ft.-lb. or less will operate the valve at the most adverse condition for which the valve is designed. Ensure the vertical axis of the operating nut does not move as the valve is opened or closed.

If the type of valve is not indicated on the plans, use butterfly valves for line valve sizes 24 in. and larger. For valves 24 in. and larger, provide valves manufactured by Pratt, Dezurik, or approved equal. Provide valves from an approved manufacturer. Provide valves and actuators from the same valve or actuator manufacturer. Ensure the shaft connecting the actuator to the valve body is fully enclosed. Provide a fully enclosed, watertight bonnet and extension

2.11.

Valve Boxes. Provide Type "A," cast-iron or ductile-iron slide-type valve boxes as manufactured by Bass and Hays Foundry, Inc. or approved equal. Ensure the chemical composition of Casting "A" conforms to the requirements of AWWA Standard C110. Fabricate the base of each valve box from 6 in. cast-iron or ductile- iron pipe, conforming to the requirements of this specification except that the lining and coating will comply with this section.

Cast a letter "W" into the lid, 1/2 in. in height and raised 3/32 in., for valves serving potable water lines.

Coat boxes, bases, and lids by dipping them in hot bituminous varnish.

2.12. **Fire Hydrants.**

2.12.1. **General.** Provide fire hydrants, including 6 in. gate valve and box, conforming to the requirements of AWWA C502, except as modified or supplemented in this specification, and that are on the Utility Owner's approved products list.

Provide fire hydrants in conformance with AWWA C 502, Standards for Dry Barrel Fire Hydrants (Latest Edition). Provide hydrants that are approved by the City of Houston. Only hydrants with a current Certification of Responsibility will be allowed. The hydrants shown in Table 4 are currently approved. Alternative hydrants will not be considered.

Table 4
Approved Hydrants

Hydrant	City of Houston Engineering Control Drawing
U.S. Pipe and Foundry Con. M-94 Metropolitan 5-1/4 in. A495	DWG 960324 Rev. dated 2/06/02
Mueller Company Super Construction 250 5-1/4 in. A423	DWG FH-70 Rev. B dated 7/02/08
American AVK Company AVK Series 2780 Nostalgic	DWG 2780-Houston-2Rev. AAD3, dated 3/24/04

Ensure they are of dry-barrel, tamper resistant, and collision-safety construction design. Provide hydrants from same manufacturer throughout the project.

Installation of used, salvaged, or reconditioned fire hydrants will not be permitted.

2.12.2. **Hydrant Barrel.** Fabricate the lower hydrant barrel as a ductile-iron single piece, and connect it to the upper hydrant barrel by means of a joint coupling that will provide a 360° rotation of the upper barrel. Clearly mark the finish grade on the barrel. Provide the specified bury length, equal to the distance from the bottom of the inlet to the ground line.

Provide the hydrant barrel with a non-tapped, non-corrodible drain or drip valve, completely made of bronze or bronze-lined. Ensure the drain valve operates, automatically and positively, to drain the barrel when the hydrant valve is in the fully-closed position, and to completely close the drain opening so as to prevent leaking when the hydrant valve is in the open position.

Equip each hydrant barrel with two 2-1/2 in. nominal inside diameter hose nozzles and a single 4 in. nominal inside diameter pumper nozzle conforming with National (American) Standard Fire Hose Coupling Screw Threads, bronze (minimum Grade D) (per NFPA No. 194 and ANSI B26-1925).

Security fasten field-replaceable nozzles into the upper barrel by mechanical means, install by turning counterclockwise, seal with O-rings, and mechanically lock in place with a security device. Provide nozzles with nozzle caps and neoprene gasket seals. Securely attach the caps to the hydrant barrel with chains of not less than 1/8 in. diameter. Situate the pumper nozzle to allow an unobstructed radius of 10 in. from the threaded surface of the nozzle throughout the path of travel of a wrench or other device used to fasten a hose to the nozzle.

Orient the hydrant so that the pumper nozzle faces the curb or street nearest the hydrant.

Design the barrel joint connecting the upper and lower hydrant sections so that the hydrant shut-off valve will remain closed and reasonably tight against leakage in the event of an impact accident resulting in damage to or breaking of the hydrant above or near ground level. Provide the joint with a breakable bolt flange or breakable coupling including an adequate number of bolts, above finish grade.

Fabricate the operating and hold down nuts of stainless steel, cast-iron, or ductile-iron with bronze inserts. Provide a security device with each hydrant employing a bronze operating nut to protect this feature of the hydrant from malicious mischief or unauthorized removal. Ensure that such security devices do not require special tools for normal off/on operation of the hydrant. For the operating nut, use a tapered pentagon 1-1/2 in. point to face at the base, and 1-1/8 in. point to face at the top of the nut, opening left (counter-clockwise). Fabricate hold down assemblies of metallic materials suitable for the intended service.

Design the hydrant barrel to permit the use of one or more standard extensions, available from the hydrant manufacturer, in lengths from 6 in. to 60 in. in 6 in. increments.

- 2.12.3 **Shut-off Valve and Inlet Shoe.** Provide hydrants with circular, compression-type shut-off valves which close with the water pressure, with center stem construction and which remain closed and tight against leakage upon impact. Ensure each shut-off valve is circular and not less than 5-1/4 in. in diameter. Seal the bottom end of the stem threads from contact with water by using a cap nut. Provide a bronze valve seat ring, threaded into a bronze drain ring to provide an all-bronze drain way. Ensure the seat ring and main valve assembly is removable from above ground through the upper barrel by using a light-weight seat removal wrench.

Construct the valve seat facing of molded rubber with a Durometer rating of 90 ± 5 , a minimum thickness of 1/2 in., and that is resistant to microbiological attack.

Unless otherwise shown on the plans, provide a hydrant inlet shoe that is an elbow with the AWWA standard bell designed for a nominal 6 in. mechanical joint hub end, or push-on assembly as specified. Provide a hydrant shoe of cast-iron or ductile-iron pipe that is flanged, swivel or slip joint with harnessing lugs for restrained joints. Coat the interior of the shoe with a minimum of 12 mils of fusion bonded epoxy conforming to NSF Standard 61. For underground flanging, incorporate a minimum of six 3/4 in. diameter electro-galvanized or cadmium-coated steel bolts or four 5/8 in. diameter stainless or cadmium-coated steel bolts.

- 2.12.4 **Valve Stem.** Where threads are located in the barrel or waterway, use Everdure operating stems, or other high-quality, non-correctible metal.

Use bronze-to-bronze working parts in the waterway; genuine wrought-iron or steel where threads are not located in the barrel or waterway, bronze bushed at the penetration of the stuffing box; seal the threads against contact with water regardless of the (open or closed) position of the main valve. Provide the valve stem with a breakable stem coupling opposite the barrel breakaway feature. Construct connecting pins and locking devices of bronze or other corrosion-resistant material. Provide the valve stem with a bronze sleeve, O-ring seals, and travel stop. Ensure the operating threads, working parts, and bearing surfaces are fully lubricated during normal operation of the fire hydrant. Ensure the lubricant is contained in a lubricating reservoir that is sealed at the top and bottom. Equip the operating assembly with a thrust bearing or lubricated thrust collar to minimize operating torque. Provide a lubricant meeting the requirements of FDA 21 CFR 178.3570 and manufactured with FDA-approved oxidation inhibitors.

Provide a valve stem that operates counterclockwise (turning to the left) to open.

- 2.12.5 **Gaskets and Seals.** Provide dynamic seals of O-ring type, oil-resistant material, which do not require adjustment for a watertight seal. Provide moving parts in contact with the seal made of bronze or other corrosion-resistant material.

Provide static seals of Buna "N" or other approved synthetic composition.

- 2.12.6 **Painting.** Shop coat the fire hydrant's exterior with 1 coat of rust prohibitive primer. Ensure the top half of the hydrant from the traffic flange up, receives 1 coat of blue enamel before delivery to the jobsite as outlined by the following:

- 2.12.6.1 **Exterior Above the Traffic Flange (Including Bolts and Nuts).** Prepare the surface in accordance with SSPC-SP10 (NACE 2), near-white blast-cleaned surface.

Coat with a 3-coat alkyd/silicone/alkyd system with a total dry film thickness (DFT) of 6-9 mils as follows:

- Prime Coat. Oil Modified Alkyd Primer, Acro Products No. 1104, Heavy Duty Tank & Steel Primer, or approved equal, in general accordance with SSPC Paint Specification No. 25. Apply with a total dry film thickness (DFT) of 2-3 mils.
- Intermediate Coat. Heavy Duty Heavy Duty Industrial Alkyd Enamel, Acro Products No. 2214, or approved equal, in general accordance with SSPC Paint Specification No. 104, and Federal Standard TT-E-489. Apply with a total dry film thickness (DFT) of 2-3 mils.
- Finish Coat. Silicone Alkyd Resin Enamel, Acro Products No. 2215, or approved equal, in general accordance with SSPC Paint Specification No. 21. Total dry film thickness (DFT) of 2-3 mils. Except do not finish shop coat the hydrant bonnet, only intermediate coat it. Field applies and color code the finish coating when installed.
- Colors. For primer, use the manufacturer's standard color. For the finish coat of the hydrant body, use blue (Acro 555 crystal blue or equivalent). Finish coat the hose connection caps white, and paint a white band of finish coat 2 in. in width on the hydrant body approximately 6 in. above and parallel to the traffic flange. For intermediate coat, use a contrasting color to the blue finish coat, such as white.

- 2.12.6.2. **Exterior Below the Traffic Flange.** Prepare the surface in accordance with SSPC-SP10 (NACE 2), near- white blast-cleaned surface.

Coat with a 3-coat system as follows:

- Primer and intermediate coat - coal tar epoxy, Acro Products No. 4467, or approved equal, in general accordance with SSPC Paint Specification No. 16. Apply 2 coats with a dry film thickness (DFT) of 8-10 mils each, for a total dry film thickness (DFT) of 16-20 mils.
- Finish coat - water based vinyl acrylic mastic, Acro Products No. 7782, or approved equal. Apply 1 coat with a dry film thickness (DFT) of 6-8 mils. For the color of the finish coat, use the same as for the finish coat for the exterior above the traffic flange i.e., blue (Acro 555 crystal blue or equivalent).

- 2.12.6.3. **Interior Surfaces Above and Below the Main Valve.** Provide material used for internal coating of hydrant interior ferrous surfaces below the main valve that is NSF61 listed as suitable for contact with potable water, as required by Chapter 290, "Rules and Regulation for Public Water Systems," Texas Commission on Environmental Quality (TCEQ).

Prepare the surface in accordance with SSPC-SP10 (NACE 2), near-white blast-cleaned surface.

Provide a liquid or powder epoxy system coating in accordance with AWWA Standard C-550. Apply the coating in 2 or 3 coats, according to the manufacturer's recommendations, for a total dry film thickness of 12- 18 mils.

- 2.12.6.4. **General.** Apply coatings in strict conformance with the manufacturer's recommendation. No requirement of this specification cancels or supersedes the written directions and recommendations of the specific coating manufacturer so as to jeopardize the integrity of the applied system.

Ensure the hydrant supplier furnishes an affidavit of compliance that the materials and work furnished comply with the requirements of this specification and referenced applicable standards.

After installing the hydrants and before the main is accepted, paint the bonnet portion of each fire hydrant as shown in Table 5.

**Table 5
Fire Hydrant Bonnet
Colors**

Size of Supply Line (in.)	Color of Bonnet
6	Yellow
8	White
10-20	Green
24 and Larger	Orange

Ensure the color shades and paint quantities are approved and comply with the current specifications.

2.12.7. **Performance Standards.** Provide hydrants capable of a free discharge of 1,500 gal. per minute (gpm) or greater, from a single pumper nozzle at a hydrant inlet static pressure not exceeding 20 psig as measured at or corrected to the hydrant inlet at its centerline elevation.

Provide hydrants capable of a discharge of 1,500 gpm or greater from a single pumper nozzle at a maximum permissible head loss of 8.0 psig (when corrected for inlet and outlet velocity head) for an inlet operating pressure not exceeding 37 psig as measured at or corrected to the hydrant inlet at its centerline elevation.

2.12.7.1. **Hydraulic Performance Testing.** AWWA C502; ensure the certified pressure loss and quantity of flow test is conducted by a qualified testing laboratory on a production model (5-ft. bury length) of the hydrant (same catalog number) proposed for certification. Submit a certified test report containing following information:

Date of test, within the previous 5 yr., on a fire hydrant with similar hydraulic characteristics. Name, catalog number, place of manufacture, and date of production of hydrants tested.

Schematic drawing of testing apparatus, containing dimensions of piping elements including:

- Diameter and length of inlet piping.
- Distance from flow measuring points to pressure measurement point.
- Distance from flow and pressure monitoring points to the hydrant inlet.
- Distance from pressure monitoring point to nozzles.
- Diameter and length of discharge tubing.

Elevation of points of measurement, inlet, and outlet.

Reports or certificates documenting the accuracy of the measuring devices used in testing.

Conduct the tests on at least 3 hydrants of the same fabrication design. Inlet water temperature: 70°F ± 5°F.

For traffic impact testing, submit a certified test report outlining the results of the traffic impact test involving standard production models of the fire hydrant with breakable barrels of the same design as that proposed for certification. Install these hydrants per AWWA C600; strike at a point 18 in. ± 2 in. above the designated ground line. Conduct tests using the point of impact on hydrant barrel within 2 in. of a line perpendicular to base and equidistant from the pumper nozzle and one hose nozzle.

Conduct successive tests simulating impacts by standard American-made vehicles with gross weights of 3,500 lb., 5,500 lb., and 10,500 lb.

Document the tests to provide the following minimum information:

- Detailed schematic drawings of the test facility.
- Complete description of the mechanical impact testing equipment used.
- Complete list of the hydrant parts and materials damaged in each impact test.

- Photographs.
- Size and static pressure of the line to which the hydrant is attached.
- Estimated of amount of water discharged, if any, from the hydrant within 30 min. immediately following the collision.

2.12.8. **Hydrant Leads.** Provide hydrant branch leads conforming to the same requirements under Section 2.2.3., “Steel Pipe Fittings;” Section 2.3., “Ductile-Iron Pipe and Fittings;” or Section 2.4., “Polyvinyl Chloride Pipe (PVC) Pipe and Fittings.”

2.13. **Polyethylene Film Wrap.**

2.13.1. **General.** Except where noted on the plans, use polyethylene film as a wrap to protect cast-iron pipe, ductile- iron pipe, and fittings. Provide polyethylene film conforming to the requirements outlined in this specification and use only in open-cut construction.

2.13.2. **Film.** Provide polyethylene film in accordance with ASTM 1248 and AWWA C105, Type 1, Class C, Category 5, Grade J-3, 2.5% to 3% carbon black content. Unless otherwise shown on the plans, provide film 8 mils thick with a minimum tensile strength of 1,200 to 2,500 psi, elongation up to 600% and either in tubular or sheet form. Furnish film supplied in tubular form in the minimum widths shown in Table 6.

Table 6
Minimum Width of Film Tube (when laying flat)

Nominal Pipe Size (in.)	Push-on Joint Flat Tube Width (in.)
4	14
6	17
8	21
10	25
12	29
14	33
16	37
18	41
20	45
24	53

For film in sheet form, furnish in widths equal to twice that shown for tube widths.

2.13.3. **Polyethylene Tape.** For taping film edges and overlays, use 3 in. wide plastic-backed adhesive tape. Use Polyken No. 900, Scotch Wrap No. 50, or approved equal.

2.14. **Bedding Material.** Unless otherwise shown on the plans, provide one of the following types of bedding for water mains:

2.14.1. **Bank Run Sand.** Furnish bank run sand bedding as called for in these specifications and consisting of soil classified as SP, SW, or SM by the Unified Soil Classification System (USCS). Provide sand with a plasticity index, when tested, of less than 7% and a liquid limit of 25 or less. Ensure the bank run sand gradation has a maximum of 15% passing the No. 200 sieve when tested, and is free of roots, organic material, trash, clay lumps, or other deleterious or objectionable material.

2.14.2. **Concrete Sand.** Furnish concrete sand bedding conforming to the specifications for Fine Aggregates specified in ASTM Standard C-33. Provide Fine Aggregates consisting of natural sand, manufactured sand, or a combination of the two, within the gradation limits shown in Table 7.

**Table 7
Fine Aggregate Gradation**

Sieve Size	Percent Passing
3/8 in.	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

Ensure the aggregates do not contain any roots, organic material, trash, clay lumps, or other deleterious or other objectionable materials, in excess of the limits prescribed in the C-33 Standard.

- 2.14.3. **Pea Gravel.** Furnish pea gravel bedding conforming to the specifications for Coarse Aggregates specified for No. 8 size in ASTM Standard C-33. Provide Coarse Aggregates consisting of gravel composed of small, smooth, rounded, stones or pebbles, within the gradation limits shown in Table 8.

**Table 8
Coarse Aggregate Gradation**

Sieve Size	Percent Passing
1/2 in.	100
3/8 in.	85-100
No. 4	10-30
No. 8	0-10
No. 16	0-5

Ensure the aggregates do not contain any roots, organic material, trash, clay lumps or other deleterious or other objectionable materials, in excess of the limits prescribed in the C-33 Standard.

- 2.14.4. **Gem Sand.** Furnish gem sand generally conforming to specifications for Coarse Aggregates specified for No. 8 size in ASTM Standard C-33. Specifically, provide aggregates within the gradation limits shown in Table 9.

**Table 9
Gem Sand Gradation**

Sieve Size	Percent Passing
3/8 in.	95-100
1/4 in.	60-80
No. 4	15-40
No. 10	0-5

Ensure the aggregates do not contain any roots, organic material, trash, clay lumps, or other deleterious or other objectionable materials, in excess of the limits prescribed in the C-33 Standard.

- 2.15. **Backfill Material.** For sand backfill encasement of water mains, use one of the following materials, unless otherwise shown on the plans:
- 2.15.1. **Cement Stabilized Sand.** Furnish cement stabilized backfill containing a minimum of 5% cement per cu. yd. of material placed, based on the dry weight of the aggregate in accordance with Tex-120-E. Provide materials consisting of aggregate, cement, and water. Use cement and water conforming to the material requirements of Item 421. Provide sand aggregate, free from deleterious matter, with a plasticity index not greater than 6 when tested by Tex-106-E.
- 2.15.2. **Earth or Native Soil.** Furnish earth or native soil backfill consisting of soil containing no deleterious material such as trash, wood fragments, organic, or other objectionable material. Supply the material from either the material removed from the excavation or from offsite sources.

The material may consist of soil classified by the Unified Soil Classification System (USCS) as ML, CH, CL, CL-ML, SC, SP, SM, SW, or GC. Use earth backfill that meets the compaction requirements specified in this specification and does not cause any settlement.

- 2.15.3. **Bank Run Sand.** Furnish bank run sand backfill as called for in these specifications and conforming to the same requirements as those under Section 2.14.1., "Bank Run Sand."
- 2.16. **Concrete.** Use Class "A" concrete in conformance to the requirements of Item 421, unless otherwise shown on the plans. Leave the forms in place unless directed to remove certain sections of the forms.
- 2.17. **Water Meters, Meter Vaults, and Meter Boxes.**
- 2.17.1. **Water Meters.** Provide meters of the type and size indicated on the plans.
- 2.17.1.1. **Provide Bolted Split Casings.** Main casings of meters and external fasteners: Copper alloy with minimum 75% copper for 5/8 in. to 2 in., bronze or cast-iron, hot-dipped galvanized or epoxy coating for coating for 3 in. and larger.
- 2.17.1.2. **Straightening Vanes.** Use non-corrosive material compatible with the case material.
- 2.17.1.3. **Intermediate Gear Train.** Do not allow the intermediate gear train to come in contact with water; operate in suitable lubricant.
- Register: Automatic Meter Reading (AMR) type that provides pulse, contact closure, piezo switch, or encoder-generated output signal, compatible with Utility Owner's radio and telephone AMR systems. Provide a minimum 12 ft. of wire when permanently connected to the register. Lens: impact resistant. Register box: tamper resistant by means of a tamper screw or plug; Register: permanently sealed, straight-reading, center- sweep test hand, magnetic driven, reading in U.S. gal. Digits: 6, black in color with the lowest registering three digits (below 1,000 gal. registration) in contrasting digit and background colors. Register capacity of meters: 9.99 million gal. for 5/8 in. to 2 in. and 999.999 million gal. for 3 in. and larger.
- Connections: 5/8 in. to 1 in.: threads at each end; 1-1/2 in. to 2 in.: two-bolt oval flanges each end; 3 in. and larger: flange at each end.
- Stamp the manufacturer's meter serial number on the outer case. Stamp the manufacturer's meter serial number on the outside of the register lid, when provided. Ensure the manufacturer's serial numbers are individual and not duplicated.
- Meters: Equip with AMR type register to connect to the Utility Owner's AMR system. Compound Meter manufactured by: Badger, Hersey Products, Neptune, Sensus, or approved equal. Turbine Meters: manufactured by Badger, Hersey Products, Neptune, Sensus, or approved equal.
- Fire Service Meters: manufactured by Hersey Products, Neptune, Sensus, or approved equal.
Displacement Meters: manufactured by Badger, Neptune, Hershey, Kent, Sensus, or approved equal.
- 2.17.1.4. **Manufacturing Quality Control.** Permit successful interchangeability from one meter to another of same size; registers, measuring chambers and units, discs or pistons as units, change gears, bolts, nuts, and washers, without affecting the accuracy of the new meters.
- 2.17.1.5. **Commercial Meter Valves for Meter Installations.** Provide commercial meter valves identical to line valves except provide them with Class 125 flanges and equip them with hand wheels operating counterclockwise to open.
- For pipe and fittings inside the meter box or meter vault, use ductile-iron conforming to Section 2.3., "Ductile- Iron Pipe and Fittings," and as specified on the plans.
- 2.17.2. **Meter Vaults.**
- 2.17.2.1. **General.** Furnish meter vaults in either of the following designs: precast concrete vault, cast-in-place concrete vault, or solid masonry, unless a specific type of construction is required on plans.

Ensure dimensions and reinforcement complies with the Utility Owner's standard meter vault drawings for the type and size shown on the plans. Use Class "S" concrete conforming to the requirements of Item 421.

- 2.17.2.2. **Precast Concrete Vaults.** Construct precast concrete vaults as shown on the plans. Use reinforcing steel conforming to the requirements of Item 440.

Install precast vaults in conformance with the manufacturer recommendations. Set level and on a minimum 3 in. thick bed of sand conforming to the requirements of Section 2.15, "Backfill Material." Seal lifting holes with cement mortar or non-shrink grout.

- 2.17.2.3. **Meter Vault Floor Slab.** Slope the floor 1/4 in. per foot toward the sump. Make the sump 12 in. in diameter, or 12 in. square, and 4 in. deep, unless other dimensions are shown on the plans. Install dowels at a maximum of 18 in., center-to-center, or install a mortar trench for keying the walls to the floor slab.

- 2.17.2.4. **Cast-In-Place Concrete Vaults.** Construct cast-in-place concrete vaults as shown on the plans. Use reinforcing steel conforming to the requirements of Item 440. Key the walls to the floor slab.

- 2.17.2.5. **Frame and Cover.** Use A-36 welded steel, or approved equal. Fabricate the cover plate with a 1/4 in. skid-resistant raised pattern floor plate. Fabricate the meter access door from the same material as the cover plate. Perform welding in accordance with the provisions of Item 441. Nondestructive testing will not be required.

Furnish castings for frames, grates, rings, and covers conforming to ASTM A48 Class 30. Provide locking covers if indicated on the plans. Use castings capable of withstanding the application of an AASHTO HS-20 loading, unless otherwise specified.

Provide covers and frames conforming to the shape dimensions, and with the wording or logos shown on the plans. The standard diameter dimension for manhole covers is 32 in. Furnish frames, grates, rings, and covers conforming to Item 471, except as noted above and except for measurement and payment.

- 2.17.3. **Meter Boxes.**

- 2.17.3.1. **General.** Furnish meter boxes for 5/8 in. through 1 in. meters of the following materials:

- Non-traffic bearing locations: cast-iron, concrete, or plastic as specified on the plans.
- Traffic bearing locations: cast iron.

Meter boxes for 1-1/2 in. and 2 in. meters: cast-iron. Provide meter box lids with a key-operated, spring type, locking device and a reading lid. Ensure the lids contain enough metals so that the meter box is easily located with metal a detector. If words are specified on the plans, cast them into lid with letters of 1/2 in. height and raised by 3/32 in. Ensure the size reads 5/8 in. to 1 in. or 1-1/2 in. to 2 in.

Furnish meter boxes conforming to the following approximate dimensions:

- Length: At the top, 15-1/2 in.; at the bottom, 20 in.
- Width: At the top, 12-1/2 in.; at the bottom, 14-3/4 in.
- Height: 12 in.

Ensure that meter box extensions 3 in. and 6 in. in height are available from the manufacturer.

- 2.17.3.2. **Cast-Iron Meter Boxes.** Furnish cast-iron boxes that are clean and free from sand blow-holes or other defects, and conforming to the requirements of ASTM A48. Machine the bearing surfaces so that the covers seat evenly in the frames. Provide boxes and lids with a dipped, coal-tar-pitch, varnish finish. Provide lock-type meter boxes when shown on the plans. Ensure the lock mechanisms work with ease.

- 2.17.3.3. **Concrete Meter Boxes.** Furnish concrete meter boxes made of Class "A" concrete conforming to requirements of Item 421. Construct boxes as shown on the plans. Furnish castings that are free

from fractures, large or deep cracks, blisters or surface roughness, or any other defects that may affect serviceability.

2.17.3.4.

Plastic Meter Boxes. Furnish plastic meter boxes made of high-density polyethylene conforming to the ASTM Specifications shown in Table 10.

Table 10
ASTM Test Requirements for Plastic Meter Boxes

ASTM Test	Requirement
D256	Impact Strength = 1.9 ft.-lb./in. (Izod, Notched)
D256	Impact Strength = 6.4 ft.-lb./in. (Izod, Un-Notched)
D638	Tensile Strength (2.0 Min) = 3,400 psi
D648	Deflection Temperature = 170°F
D790	Flexural Modulus = 90,000 psi
D676	Shore D Hardness, 55-65 Impact Strength, Falling Dart Method, 100 in.-lb.

Provide meter boxes meeting the following test requirements:

- Static Load: Not less than 2,500 lb. using a 6 in. disc with direct compression exerted at the center of the top of the meter box with a solid plastic lid.
- Deflection: Not less than 1,000 lb. load required to deflect the top edge of the meter box 1/8 in.

Provide a meter box body, without lid, weighing approximately 7 lb.

2.18.

Affidavit of Compliance. Unless otherwise directed, furnish a manufacturer's affidavit of compliance for each of the materials used in this project. Ensure the affidavit certifies that factory inspection and specified tests were performed and that the material furnished complies with the requirements outlined in this specification.

2.19.

Pressure Reducing Station. Unless otherwise shown on the plans, furnish new and unused station piping, valves, and fittings, of the same type as specified on the plans.

Use Class "S" concrete in conformance with Item 421.

Provide reinforcing steel in conformance with Item 440.

Provide a Pressure Reducing Valve (PRV) with a strainer, in the location and arrangement shown on the plans. Provide a valve body made of ductile iron with Class 150 ANSI B16.1 flanges. Provide a valve cover made of ASTM A 48 cast iron. Use Buna-N rubber parts. No leather parts are allowed. Provide a resilient seat with a rectangular cross-section.

Valve internals: Provide a single moving disc and diaphragm assembly. Use a flexible nylon fabric-reinforced elastomer diaphragm integral with assembly. Provide valve internal trim (seat ring, disc guide, and cover bearing) made of stainless steel. Apply a heat fusion bonded epoxy coating to the internal and external surfaces of the valve body including the disc retainer and diaphragm washer. Holiday test the coating applied to the valve body to confirm a minimum even coating of 5-7 mils. Treat the stem with a penetrative salt nitride process. Use a Xylan-coated seat. Leather parts are not allowed. Prepare threaded connections by first using an approved pipe tape.

Furnish control tubing containing shutoff cocks with a "Y" strainer. Equip the valve to allow installing control tubing on either side of the valve. Equip the valve with a valve position indicator.

Ensure the valve and valve box are initially set in the field by an authorized manufacturer's representative. Set the downstream pressure at 60 psi unless otherwise specified. Ensure the PRV includes an adjustable and pressure sustaining pilot system. Use a diaphragm type or piston type valve for the main valve.

Provide Cla-Val Model 90-01BDSYKCKD, Watts ACV Model 115-3M, or approved equal.

Provide a basket strainer upstream of the pressure reducing valve as shown on the plans. Furnish a quick-opening type strainer body, of fabricated steel construction with ANSI Class 150 flanges. Use Type 304 stainless steel for the basket.

Provide a Hayward Model 90, or equal, for PRV's 4 in. to 24 in. When there are space constraints, provide a Hayward Model 510, or equal, for PRV's 14 in. or greater.

- 2.20. **Adjusting Manholes.** Reuse removed manhole and inlet rings, plates, grates, covers, and brick if they are in good condition as determined by the Engineer. Provide additional materials in accordance with Item 465 at no cost to the Department. Single- or multiple-piece prefabricated metal extension rings may be used for the adjustment of manholes as approved. Provide concrete that conforms to the requirements of Item 421.

3. CONSTRUCTION

All construction must conform to the requirements of this Item, the plans and the following Items:

- Item 100, "Preparing Right of Way"
- Item 400, "Excavation and Backfill for Structures"
- Item 402, "Trench Excavation Protection"
- Item 403, "Temporary Special Shoring"
- Item 421, "Hydraulic Cement Concrete"
- Item 465, "Junction Boxes, Manholes, and Inlets"
- Item 476, "Jacking, Boring, or Tunneling Pipe or Box"
- Item 479, "Adjusting Manholes and Inlets"

- 3.1. **Excavation.**

- 3.1.1. **Trenches.** Construct water lines and fire hydrant branches (leads) in open cut trenches with vertical sides except in those locations where the pipe is tunneled, cased, or augered. Construct the trenches to the dimensions shown in the excavation and backfill details.

Sheath and brace the trenches to the extent necessary to maintain the sides of the trench in a vertical position throughout the construction period. Protect excavation greater than 5 ft. in depth as specified by Item 402, or Item 403.

Open and excavate the trenches to the finished grade. To allow for possible adjustment of the alignment and grade, locate the water mains to which the mains and fire hydrant branches (leads) under construction are to be connected, well in advance of making connections.

Construct water mains and fire hydrant branches (leads) in dry trenches. If necessary, employ well pointing or additional sheathing to accomplish this objective, at no additional cost to the Department.

For pipes less than 18 in. in diameter, the minimum trench width below the top of the pipe is the outside diameter of the pipe, plus 18 in. For pipes 18 in. and larger, the minimum trench width below the top of pipe is the outside diameter of pipe plus 24 in. Additional width will be required for unstable conditions. The Engineer will determine unstable conditions.

Where it is necessary to excavate trenches adjacent to improved property, take precautions to avoid damaging or impairing that property. Where it is necessary to disturb grass, shrubs, driveways, etc., restore such improvements to their original condition.

Use enough trench width or benches above the embedment zone when installing well point headers or manifolds and pumps, where the trench depth makes it uneconomical or impractical to pump from the surface elevation. Provide enough space between the shoring cross braces to permit equipment operations and handling the forms, pipe, embedment and backfill, and other materials.

Before moving the supports, place and compact the embedment to enough depth to provide protection of the pipe and stability of the trench walls. As the supports are moved, finish placing and compacted the embedment.

Immediately before placing the embedment materials, ensure the bottoms and sidewalls of trenches are free of loose, sloughing, caving, or otherwise unsuitable soil.

Place and compact the embedment materials directly against the undisturbed soils in the trench sidewalls or against sheeting which will remain in place.

Do not place trench shields or shoring within the height of the embedment zone unless using some means to maintain the density of the compacted embedment material. If using moveable supports in embedment zone, lift the supports incrementally to allow placing and compacting of the material against undisturbed soil.

Place haunching material around the pipe and compact it to provide uniform bearing and side support.

Place trench dams in Class I embedments near the midpoint of line segments longer than 100 ft. between manholes.

Where damage to the completed pipe installation work is likely to result from withdrawal of the sheeting, leave the sheeting in place.

3.1.2. **Existing Streets.** Unless otherwise shown on the plans, open cut existing streets.

Where water line construction requires cutting through existing streets outside the limits of new street construction, replace those streets in kind in conformance with the appropriate specifications in the proposal or as directed. When cutting pavement outside the Department's right of way, comply with the Utility Owner Street Cutting Ordinance.

Where, in the opinion of the Engineer, it is necessary to maintain traffic across a trench, construct temporary bridges as necessary to facilitate the movement of traffic.

At locations where the proposed water main parallels the edge of an existing permanent pavement (i.e., concrete pavement, concrete base with asphalt surface, etc.), and is 3 ft. or less from the edge of that pavement, protect the trench with timber sheathing and bracing. Leave the bracing in place at intervals of 5 ft. maximum.

Keep the street surface adjacent to the trench free of surplus spoil. Place construction materials at locations that minimize interference with the traveling public.

Do not close more than 2 street intersections at any one time unless authorized in writing..

3.2. **Jacking, Tunneling, Boring, or Augering.**

3.2.1. **General.** Perform jacking, tunneling, or augering for water mains and fire hydrant branches (leads) at the locations shown on the plans and at other locations specifically designated by the Engineer.

Unless otherwise shown on the plans, use casing pipe conforming to the requirements of Section 2.2.2., "Steel Casing Pipe."

Excavate auger pits to a finished grade at least 6 in. lower than that indicated by the construction stakes or as approved, to ensure that a dry pit bottom is encountered.

Provide a minimum width of jacking, tunneling, or augering pits such that there is at least 6 in. of space between the pipe and the walls of the auger pit. The maximum allowable width of the pit is 5 ft., unless otherwise approved. Ensure the width of the pit at the surface is not less than at the

bottom. The maximum allowable length of the pit is 5 ft. longer than 1 full joint of pipe of the type being used and does not exceed 25 ft., unless approved.

Grout in place tunnels for water lines with 36 in. diameters. When casing size is 48 in. in diameter or greater, or when using a tunnel liner plate, regardless of the water line diameter, grout in place unless otherwise directed. Provide an annular grout consisting of a sand-cement mortar mix with a 28 day compressive strength of at least 1,500 psi, when tested in accordance with ASTM C 942. The maximum allowable density is 130 pcf.

Use admixtures meeting ASTM C 494 and ASTM C 1017 as required, to improve pump ability, control the time of set, hold sand in suspension, and reduce segregation and bleeding. Fill the annular space in 3 lifts to prevent pipe floating. In addition, place appropriate blocking between the carrier pipe and the top of the liner to maintain position. Place a concrete invert to facilitate threading the carrier pipe.

Do not allow inadvertent metallic contact between the casing and the carrier pipe. Place spacers to ensure that the carrier pipe is adequately supported throughout its length, particularly at ends, to offset setting and possible electrical shorting, unless otherwise approved by Engineer. Ensure the end spacer is within 6 in. of the end of the casing pipe, regardless of the size of the casing and carrier pipe or the type of spacer used. Casing spacers are designed to withstand much greater loads than can be safely applied to most coatings. Therefore, the spacing between spacers depends largely on the load bearing capabilities of the pipe coating and the flexibility of the pipe.

Install casing spacers in conformance with the manufacturer's instructions. Use special care to ensure that subcomponents are correctly assembled, evenly tightened, and that no damage occurs while tightening the insulators or inserting the carrier pipe.

Seal the annulus between the carrier pipe and casing with casing end seals at each end of the casing.

Insular Spacing:

- Provide spacing as shown on the plans with a maximum distance between spacers of 10 ft. for pipe sizes for pipe sizes 4 in. to 14 in. and 8 ft. for pipe sizes 16 in. to 30 in.
- For ductile-iron pipe, flanged pipe, or bell-and-spigot pipe, install spacers within 1 ft. on each side of the bell or flange, and one in the center of the joint when 18 ft. to 20 ft. long joints are used.
- If the casing or carrier pipe is angled or bent, reduce the spacing. Provide the casing with a smooth, continuous interior surface.

Perform bedding and backfilling of jacking, tunneling, boring, or augering pits in conformance with the details on the plans and these specifications.

3.2.2. **Jacking Steel Casing.** Perform jacking of steel casing in accordance with the requirements of Item 476.

3.2.3. **Tunneling.** Perform tunneling in accordance with the tunneling requirements of Item 476.

3.2.4. **Boring or Augering.** Perform boring or augering in accordance with the requirements of Item 476.

Do not exceed 100 ft. for the length of the auger hole without a receiving pit.

Do not exceed 75 ft. for the length of the auger hole for PVC pipe 12 in. and less in diameter without a receiving pit.

Do not exceed 40 ft. for the length of the auger hole for PVC pipe 16 in. and greater in diameter without a receiving pit.

At locations where water pipes cross underneath driveways (of 16 ft. or less in width) or sidewalks, install the pipe in tight fitting augered holes.

At locations where the centerline of the proposed water main is 10 ft. or less from the centerline of an 8 in. diameter or larger growing tree, place the pipe in a tight fitting augered hole. Extend the bored hole at least 4 ft. beyond each side of the tree.

Block the void space around the pipe in the augered hole with approximately 12 in. of packed clay or similar approved material, so that the bedding or backfill does not escape into the void around the pipe in the auger hole, when compacted.

Around the pipe, use the minimum volume of the clay or similar acceptable material as shown in Table 11.

**Table 11
Volume of Clay or Acceptable Material for Blocking Voids**

Pipe Diameter (in.)	Minimum Quantity (cu. Ft.)
4 through 8	0.5
12 through 16	0.75

3.2.5. Bedding for Trenches and for Jacking, Tunneling, Boring, or Augering Pits.

3.2.5.1. Pipe Bedding for Water Mains Less Than 24 Inches in Diameter.

3.2.5.1.1. Open Cut Trench Installation. Construct trenches with a minimum of 6 in. bedding. Remove the soil in the bottom of the trench, excavate to a minimum depth of 6 in. below the bottom of the pipe, and replace the soil with bedding material. Remove saturated material from the bottom of the pit before placing the bedding. Place the pipe in the bedding such that there is a 6 in. bedding below and up to the spring line of the pipe.

Compact the bedding material to within 95% of the standard density within 5% of the optimum moisture as determined by Tex-113-E. Mechanically compact the bedding material by using vibratory equipment or any other acceptable equipment.

3.2.5.1.2. Jacking, Tunneling, Boring or Augering Pits. Construct pits with a minimum of 6 in. bedding. Remove the soil in the pit, excavate to a minimum depth of 6 in. below the bottom of the pipe and replace the soil with bedding material.

If the bottom of the excavation becomes wet due to the presence of groundwater and a dewatering system is not required, and if directed, over excavate an additional 6 in. to a depth of 1 ft. below the bottom of the pipe. Place a non-woven geotextile fabric and then compact 12 in. of bank run sand or concrete sand in a single lift on top of the fabric. Compact the upper 6 in. to 90% of the standard maximum density as determined by Tex- 113-E. The Engineer may require the Contractor to remove unstable or unsuitable material, even though the Contractor has not determined the material to be unsuitable.

Mechanically compact the bedding material by using vibratory equipment or any other acceptable equipment. Compact the bedding material to 95% of the standard density within 5% of the optimum moisture, as determined by Tex-113-E.

3.2.5.1.3. Bedding Materials. The following describes the acceptable materials for bedding:

- Section 2.14.1., "Bank Run Sand"
- Section 2.14.3., "Pea Gravel"

Bank run sand may be used as bedding material around the pipe only if, as determined by the Engineer, the trench bottom and sides are dry. If sand is used, place the pipe in the bedding so that there is at least 6 in. bedding around and on top of the pipe. Compact the sand as described in Section 3.2.5.1.1., "Open Cut Trench Installation."

3.2.5.2. Pipe Bedding for Water Mains 24 Inches or Greater in Diameter.

Open Cut: Provide pipe bedding as described in Section 3.2.5.1., "Pipe Bedding for Water Mains Less Than 24 Inches in Diameter," with the following exceptions: Use bank run sand for the bedding material as described in Section 2.14, "Bedding Material."

Compact cement stabilized sand used as backfill or as pipe bedding as specified on the plans, in 6 in. lifts to 95% of the standard maximum density as determined by Tex-113-E, at the optimum moisture content.

- 3.3. **Handling Pipe and Accessories.** During pipe construction operations, use caution to prevent injury to the pipe, protective linings, and coatings in conformance with the manufacturer's recommendations. Do not place debris, tools, or other materials in the pipe.

Repair any damage to the pipe or the protective lining and coating from any cause during the installation of the pipeline and before final acceptance by the purchaser. Perform this work as directed, in conformance with the applicable standards, and at no cost to the Department.

Unload pipe, fittings, valves, and accessories at the point of delivery and haul them to the project site. Distribute the material opposite or near the place where it will be laid in the trench such that storm water or runoff will not enter or pass through the pipe. Do not drop the materials. Do not allow pipe handled on skid ways to be skidded or rolled against pipe already on the ground.

Load, transport, unload, and otherwise handle pipe and fittings in a manner and by methods which prevent damage of any kind. Handle and transport pipe with equipment designed, constructed, and arranged to prevent damage to the pipe, lining, and coating. Do not allow bare chains, hooks, metal bars, or narrow skids or cradles to come in contact with the coatings. Provide pipe fittings with enough interior strutting or cross-bracing to prevent deflection under their own weight.

Hoist the pipe and fittings from the trench side into the trench by means of a sling of smooth steel cable, canvas, leather, nylon, or similar material. Do not lift pipe by using hooks at each end of the pipe. When stacking pipe, ensure it is packaged on timbers. Place protective pads under the banding straps at the time of packaging.

When using fork trucks to relocate pipe, pad the forks using carpet or some other suitable type of material. When relocating pipe using a crane or backhoe, use nylon straps or smooth steel cable, do not use chains, around the pipe for lift.

- 3.4. **Cutting Pipe.** Cut pipe 12 in. in diameter and smaller in conformance with the manufacturer's recommendations. Cut pipe larger than 12 in. in an approved manner. Perform each cut at right angles to the axis of the pipe and file or grind to remove sharp edges. Use a cutting machine unless otherwise approved by Engineer. Do not damage pipe or linings and coatings, while cutting.

- 3.5. **Defective or Damaged Material.** Inspect pipe and accessories for defects before lowering into the trench. Repair or replace any defective, damaged, or unsound material as directed.

If a damaged piece of pipe, furnished by the Contractor, is placed in the water main, furnish the labor and materials necessary to remove and replace the defective pipe and to restore the street to its original condition at no cost to the Department. If the Contractor damages the pipe after installation, the Engineer may permit the damaged section to be cut from the length, unless it is the opinion of the Engineer that the entire length was damaged. The cost of and replacement of broken pipe is at the expense of the Contractor.

- 3.6. **Cleaning Pipe and Accessories.** Remove lumps, blisters, and excess coating from the bell and spigot ends of steel pipe, ductile-iron pipe, valves, hydrants, and fittings. Wire brush the outside of the spigot and the inside of the bell and wipe clean, dry, and free from oil and grease before laying the pipe.

Remove foreign matter or dirt from the interior of water pipe, accessories, and from the mating surfaces of the joints, before lowering the material into the trench. Keep the pipe and accessories clean during and after laying by approved means.

Use cleaning solutions, detergents, solvents, etc. with caution when cleaning PVC pipe.

Provide cleanup and restoration crews to work closely behind the pipe laying crews, and where necessary, during disinfection, testing, service transfers, abandonment of old mains, backfilling, and surface restoration.

Upon completely installing a section not exceeding 4,000 ft. per crew, immediately prepare to disinfect and pressure test between valves or plugs. No later than 3 days after completing disinfection preparatory work, submit to the Utility Owner an appropriate request for disinfection.

Begin transfer of services no later than 7 calendar days after successfully completing the disinfection and pressure testing.

Immediately after transfer of services, begin abandonment of the old mains, including re-sodding and placing sidewalks and pavements.

Do not begin construction of additional sections if the above conditions are not met.

For large diameter water mains, do not install more than 2,000 ft. of main, until the previous 2,000 ft. is cleaned up and the site is fully restored. Schedule paving crews so that the repaving work will not lag behind the pipe laying work by more than 1,000 ft.

Completely restore the site within 30 days from the date the water main is successfully disinfected and hydrostatically tested, unless extended in writing by the Engineer.

For projects involving multiple locations, limit water main installation to a maximum of 2 project site locations.

Remove construction debris or foreign material and thoroughly clean and flush piping systems as approved. Provide temporary connections, equipment, and labor for cleaning. The Engineer must inspect the water main for cleanliness before filling.

Disinfection of Water Lines: Conform to the requirements of Section 3.17., "Disinfecting Mains and Testing for Leakage."

3.7. **Laying Pipe.** For the work of laying the pipe, employ only workers who are skilled and experienced in laying pipe of the type and joint configuration being furnished. Provide watertight pipe and pipe joints. Lay pipe with the bell ends facing in the direction of laying, unless otherwise directed.

Lay pipe to the lines and grades shown on the plans. To ensure proper placement, use adequate surveying methods and equipment, and employ personnel competent in using this equipment. Ensure the pipe does not deviate from the horizontal and vertical alignment indicated on the plans by more than 0.10 ft., without prior approval. Measure and record the "as-built" horizontal alignment and vertical grade at a maximum of every 50 ft. on the on-site recorded plans.

During pipe laying operations, keep pipe trenches free of water which might impair the laying operations. Ensure holes for bells are of ample size to prevent the bells from coming in contact with the subgrade. Carefully grade pipe trenches to provide uniform support along the bottom of the pipe.

Do not lay more than 50 ft. of pipe in the trench ahead of the backfilling operations. If pipe laying operations are interrupted overnight, cover the pipe laid in the trench simultaneously on each side of the pipe or completely backfill, to avoid lateral displacement of the pipe and damage to the joints. If adjustment of the position of a length of pipe is required after it is laid, remove and re-lay it in conformance with these specifications and at no expense to the Department. After pipe laying and joining operations are complete, clean the inside of the pipe and remove debris.

Use care to prevent damage to the coating when placing backfill. Backfill in accordance with Section 3.11, "Backfilling."

Lay pipe in a straight line unless otherwise shown or approved. Long radius curves, either horizontal or vertical, may be laid with standard pipe using deflections at the joints. If curved pipe is shown, needing no special fittings, the curves can be made by deflection of the joints with standard lengths of pipe as approved. If maximum pipe joint deflections are permitted, do not exceed the manufacturer's recommendation for maximum pipe joint deflections. Joint the gasketed pipe in a straight alignment and then deflect it to the curved alignment.

If the vertical deflection exceeds the maximum recommended by the manufacturer, remove the entire portion of the deflected pipe section and install new pipe as directed. Perform this work at no expense to the Department. The Engineer may measure assessment of deflection at any location along the pipe. Arithmetical averages of the vertical deflection or similar average measurement methods will not be deemed as meeting the intent of the standard.

Where field conditions require horizontal deflection curves not shown on the plans, the Engineer will determine the methods to be used.

No additional payment will be made for laying pipe on curves as shown, or for change orders involving standard lengths of pipe deflected at the joints. Adjust the pipe, valves, hydrants, and fittings to be at their proper locations and prepare each joint as specified in Section 3.8., "Joining Pipe and Accessories." As each joint of pipe is laid in the trench, center the spigot end in the bell of the previously laid pipe, then force home the pipe and bring it to the correct line and grade. Ensure each length of pipe rests on the bottom of the trench and is inspected for damage throughout its entire length.

When pipe lying is discontinued for the day or for an indefinite period, tightly place a cap or plug in the end of the last pipe laid to prevent the intrusion of water. When water is excluded from the interior of pipe, place enough backfill on the pipe to prevent floating. Schedule the work to prevent the possibility of floatation. Remove from the trench any pipe that has floated and re-lay as directed.

When assembling PVC pipe on top of the trench, allow it to cool to ground temperature before backfilling, to prevent pull-out due to thermal contraction.

Do not schedule night works or plant shut down to begin within 2 working days before or after Utility Owner- designated holidays.

For tie-ins to existing water mains, provide the necessary material on-hand to facilitate connection before shutting down the existing water main.

Ensure that separation from gravity sanitary sewers and manholes, or from force mains, is a minimum of 9 ft. clearance in all directions or as specified, unless a special design is shown on the plans.

Minimum Clearance of this specification:

- Parallel water line and gravity sanitary sewer force main, or manhole with no leaks:
Minimum 4 ft. horizontal clearance from the outside wall of the water line to the outside wall of the gravity sanitary sewer, force main, or manhole.
- Water line crossing above gravity sanitary sewer or force main with no leaks:
Minimum 2 ft. vertical clearance.
- Water line crossing below a sanitary sewer or force main with no leaks:
Minimum 2 ft. vertical clearance.

3.8

Joining Pipe and Accessories.

3.8.1

Ductile-Iron Pipe, Valves, Hydrants, and Fittings. After thoroughly cleaning the inside of the bell and the outside of the spigot, install members in conformance with the manufacturer's recommendation and AWWA C600, or as modified by these specifications.

Mark pipe and accessories that are not furnished, with a depth mark before assembly to ensure that the spigot end is inserted to the full depth of the joint.

Brace the fittings on small mains with short pieces of 2 in. galvanized pipe as directed.

Brace each plug installed under this contract by a standard pipe clamp, a 3 ft. nipple of the same diameter pipe as the nearby sections of mains, and a block of concrete.

For 4 in. through 12 in. water mains, use pipe clamps that are Underwriters Lab-approved for underground water service piping. For water mains 16 in. and larger, use pipe clamps conforming to details shown on the plans.

For rubber-gasketed joints use lubrication that is water soluble, non-toxic, non-objectionable in taste and odor imparted to the fluid, non-supporting of bacteria growth, and has no deteriorating effect on coatings or rubber gaskets.

- 3.8.2 **Polyvinyl Chloride Pipe and Accessories.** Join plastic pipe in conformance with the instructions furnished by the manufacturer. To prevent weakening the joint, do not handle or install in the trench pipe joined using solvent cementing techniques, until the joints "cure."

For rubber-gasketed joints, use lubrication that is water soluble, non-toxic, non-objectionable in taste and odor imparted to the fluid, non-supporting of bacteria growth, and has no deteriorating effect on PVC or rubber gaskets.

- 3.8.3 **Welded Joints for Steel Pipe.** Ensure the joints receive a full-penetration butt weld type double weld, in accordance with AWWA C206. It is the Contractor's option to use either automatic or hand welders. Before starting the work, provide proof of certification of qualification for welders employed on the project for every type of work procedure and position involved. Ensure qualification is in accordance with AWWA C206. Ensure complete penetration of deposited metal with the base metal. Provide inside fittings and joints that are free from globules of weld metal that would restrict flow or become loose.

Miter end cuts of both ends of butt-welded joints may be used for joint deflections of up to 2.5°.

Set fittings and joints square and true, and preserve the alignment during welding operations. Align the butting ends to minimize the offset between surfaces. For pipe of the same nominal wall thickness, do not exceed 1/16 in. offset. Use line-up clamps for this purpose; however, exercise caution to avoid damaging to the linings and coatings.

Furnish each welder employed with a steel stencil for marking welds, so the work of each welder can be identified. Mark pipe with the assigned stencil adjacent to the weld. If a welder leaves the job, void that stencil and do not duplicate it. Welders making defective welds must discontinue work and leave the project site. Such welders may return to the project site only after recertification.

During welding, protect the lining by draping an 18 in. wide strip of heat-resistant material over the top half of the pipe on each side of the lining holdback to avoid damage to the lining by the hot splatter. Protect the tape coating similarly.

Provide welding rods of a type compatible with the metal being welded, to obtain the strongest bond, E-70XX.

Deposit the metal in successive layers so there will be at least 2 passes or beads for automatic welding and 3 passes or beads for manual welding in the completed weld.

On welds, do not deposit more than 1/4 in. of metal on each pass. Thoroughly clean the weld by wire brushing and hammering on each individual pass including the final one, to remove dirt, slag, or flux.

Do not perform welding under any weather condition that would impair the strength of the weld, such as wet

surface, rain or snow, dust or high winds, unless the work is properly protected.

If using tack welds, ensure they are of the same material and made by the same procedure as the completed weld. Otherwise, remove tack welds during the welding operation.

Remove dirt, scale, and other foreign matter from the inside of piping before tying in sections, fittings, or valves.

Provide a minimum overlap of 4 in. of butt strap over the adjacent piece on butt strap closures.

Employ an approved independent certified testing laboratory, to perform weld tests and associated work to accommodate testing on the entire job. Include the cost of such testing in the contract unit bid price for the water main. Furnish copies of test reports to the Engineer for review. Ensure testing is by X-ray methods for butt welds and is performed for every joint weld. If a defective weld is revealed, assume the cost of repairing and retesting the repaired weld. The Engineer has the full and final decision as to the suitability of welds tested. If any interior or exterior coating or lining is damaged during the welding process, repair it and return it to its original state as approved, in conformance with applicable AWWA standards.

Provide cylindrical corrosion barriers (CCBs) for epoxy-lined steel pipe smaller than 24 in. in diameter. Furnish CCBs manufactured by CCB International, Inc., or approved equal. CCBs are not required if the minimum wall thickness is 1/2 in. or greater.

In addition to the welding requirements contained in this specification, conform to the protection fitting manufacturer's installation recommendations.

Provide the services of a technical representative of the manufacturer available on site at beginning of pipe laying operations. Ensure this representative is able to train welders and advise regarding installation and general construction methods. Employ only welders with at least 12 mo. experience installing protection fittings.

3.8.4. **Flanged Joints for Steel Pipe.** Before installing bolts, accurately center the flange joints and align them to prevent mechanical pre-stressing of flanges, pipe, and appurtenances. Align bolt holes to straddle the vertical, horizontal, or north-south, centerline. The maximum inclination of the flange face from the true alignment is 3/64 in. per foot.

Use full-face gaskets for flanged joints. Provide 1/8 in. thick cloth inserted rubber gasket material. Cut the gaskets at the factory to the proper dimensions.

Unless otherwise noted, provide insulation kits at connections to the existing water system or at locations to isolate one type of cathodic system from another type; between water line, access manhole piping, and other major openings in the water line; or as shown on the plans.

For isolating flange joints 30 in. in diameter and greater, and at butterfly valve flanges, provide a Pyrox G-10 with nitrite seal, Type E LineBacker gasket as manufactured by Pipeline Seal and Insulator, Inc., or approved equal, conforming to ANSI A 21.11 mechanical joint gaskets. For isolating flange joints 24 in. in diameter and smaller, provide a Phenolic PSI with nitrite seal, Type E LineBacker gasket as manufactured by Pipeline Seal and Insulator, Inc., or approved equal, conforming to ANSI A 21.11 mechanical joint gaskets.

Use galvanized or black nuts and bolts to match the flange material. Use cadmium-plated steel nuts and bolts underground. Tighten the bolts progressively to prevent unbalanced stress. Consistently maintain approximately same distance between the two flanges at all points around the flanges. Tighten the bolts alternately (180° apart) until they are evenly tight. Draw the bolts right to ensure properly seating the gaskets. Provide Denso, or approved equal, petroleum-based tape wrapping system for nuts and bolts.

Pay particular attention to procedures used in tightening and torquing flanged joints. Improper methods may result in leakage and require corrective measures. Follow recommended industry standards and guidelines as set forth by the various fabricators and manufacturers.

3.8.5. **Flanged Joints For Use On Ductile-Iron Pipe.** See the requirements of Section 3.8.4., "Flanged Joints for Steel Pipe."

3.9 **Thrust Restraint.** Provide adequate temporary blocking of fittings when making connections to the distribution system and during hydrostatic tests. Provide enough anchorage and blocking to resist stresses and forces encountered while tapping the existing waterline. For new waterlines 16 in. in diameter and larger, provide restraining joints as specified in this section. Provide restrained joint lengths as shown on the plans or as directed. For existing waterlines and waterlines less than 16 in. in diameter, restrain pipe joints with concrete thrust blocks or provide joints as specified in this section.

The length of the restrained joints shown on the plans, assumes that hydrostatic testing will begin upstream and proceed downstream with respect to the normal flow of the water in the pipe. If installation or testing of the pipe differs from this assumption, submit for approval a revised method of restraining the pipe joints upstream and downstream of the device used to test against (i.e., block valve, blind flange, or dished head plug).

3.10 **Electrical Continuity Bonds.**

3.10.1 **General.** Attach the bond wires at the required locations using the Thermite welding process.

3.10.2 **Thermite Welding Methods.** Perform Thermite welding of bond wires to the piping in the following manner:

Ensure the pipe to which the wires will be attached is clean and dry. Use a grinding wheel to remove coating, mill scale, oxide, grease, and dirt from an area approximately 3 in. square. Grind the surface to bright metal.

Remove approximately 1 in. of insulation from each end of the wires to be Thermite welded to the structure, exposing clean, oxide-free copper for welding.

Select the proper size Thermite weld mold as recommended by the manufacturer. Place the wire between the graphite mold and the prepared metal surface. For No. 12 AWG size wires, use a copper sleeve crimped over the wire. Place the metal disk in the bottom of the mold. Place the Thermite weld charge in the mold.

Squeeze the bottom of the cartridge to spread ignition powder over the charge.

Close the mold cover and ignite the starting powder with a flint gun. After the exothermic reaction, remove the Thermite weld mold and gently strike the weld with a hammer to remove the weld slag. Pull on the wire to assure a secure connection. If the weld is not secure or the wire breaks, repeat the procedure with a new wire. If the weld is secure, coat bare metal and weld metal with a coal-tar compound. If a polyurethane dielectric coating has been used, use a compatible polyurethane coating.

3.11 **Backfilling.**

3.11.1 **General.** Backfill trenches in accordance with the requirements of Item 400.

Begin backfilling and cleaning up each section of main, i.e., from valve to valve, immediately upon the completing the hydrostatic test, unless otherwise permitted by Engineer, and continue until obtaining a final and complete clean-up of the section. Any portion of the trench that is left open in excess of that required to facilitate hydrostatic testing may be ordered closed by the Engineer.

Use surplus excavated materials in the embankments or dispose of them as directed.

3.11.2 **Backfilling Pipe for Water Mains.**

- 3.11.2.1. **Open Cut.** After the pipe joints are made up and inspected, backfill the trenches with excavated materials or any other backfill material covered by this specification, as approved. Backfill the portion from the spring line of the pipe (or from 6 in. on top of pipe if sand bedding is used) to the top of the trench in maximum lifts of 9 in. loose measurement (provided the trench is not located in sidewalks, roadways, roadway shoulders, driveways, etc. that are being used for automobile or pedestrian traffic). Mechanically compact the backfill material using vibratory equipment, or any other acceptable equipment, so that no settlement occurs. Compact to a density of at least 95% of the maximum dry density, as determined in accordance with Tex- 114-E. The Engineer reserves the right to perform compaction tests on an as-needed basis. Compaction by water tamping is prohibited.

Do not allow dirt, clods, or trench sides to fall or rest against the pipe before completing the embedment or backfill.

The allowable materials for backfill are listed in Section 2.15, "Backfill Material."

Continue backfilling and compacting in this manner to the minimum elevation shown in the excavation and backfill diagram.

- 3.11.2.2. **Boring or Augering Pits.** Backfill boring or augering pits with bank run sand up to 1 ft. from the top of the natural ground. For the final 12 in., use backfill consisting of 10 in. of native soil in the bottom and 2 in. of bank run sand just below the grass.

Backfill the portion from the spring line of the pipe to the top of the pit in lifts not exceeding 9 in. (loose measurement). Mechanically compact the backfill by using vibratory equipment, or any other acceptable equipment, so that no settlement occurs. Compact the material to a density of at least 95% of the maximum dry density at optimum moisture content as determined in accordance with Tex-113-E or Tex-114-E. The Utility Owner may perform compaction tests on an as-needed basis. Compaction by water tamping is prohibited.

Do not allow dirt, clods, or auger pit sides to fall or rest against the pipe before completing the embedment or backfill.

The only allowable material for backfill in boring or augering pits is bank run sand, described in Section 2.15, "Backfill Material."

- 3.12. **Valves and Fire Hydrants.** Ensure each valve and fire hydrant is completely closed when placed in the pipe line.

Install valves and hydrants in accordance with AWWA C600, except where modified by this specification. Provide drainage at the base of the hydrant in accordance with AWWA C600. Set each hydrant at the location and grade indicated by the stakes, and plumb, brace, and install in accordance with AWWA's requirements for fire hydrant installation. If the barrel of a hydrant is to pass through a concrete slab, fit a piece of 1 in. thick pre formed bituminous expansion joint material closely around the section of the barrel passing through the concrete.

Locate the nozzle centerline a minimum of 18 in. above the finish grade.

Place 12 in. x 12 in. yellow indicators (plastic, sheet metal, plywood, or other approved material) on pumper nozzles of new or relocated fire hydrants installed on new mains not in service. Remove indicators after the new main is tested and approved.

- 3.13. **Tapping Sleeves and Valves.**

- 3.13.1. **General.** Install tapping sleeves and valves at the locations and using the sizes shown on the plans. Thoroughly clean the tapping sleeve, tapping valve, and pipe in conformance with the manufacturer's instructions before installing.

Hydrostatically test the installed tapping sleeve to 150 psig for a minimum of 15 minutes. Inspect the sleeve for leaks, and remedy any leaks before the tapping operation.

When tapping concrete pressure pipe, size on size, use a shell cutter one standard size smaller than that of the water line being tapped. Do not use Large End Bell (LEB) increases with a next size tap except for existing asbestos-cement pipe.

- 3.13.2. **Installation.** Verify the outside diameter of the pipe to be tapped before ordering the sleeve. Tighten the bolts in the proper sequence to avoid placing undue stress on the pipe. Align the tapping valve properly and attach it to the tapping sleeve. Insert the insulation sleeve into the flange holes of the tapping valve and pipe. Insert the sleeve on pipe side of tapping valve. Do not damage insulation sleeves during the bolt tightening process.

Make the tap with a sharp shell cutter using the following criteria: For 12 in. and smaller taps use a minimum cutter diameter 1/2 in. less than the nominal tap size. For 16 in. and larger taps, use the manufacturer's recommended cutter diameter.

Withdraw the coupon and flush the cuttings from the newly-made tap. For 12 in. and smaller taps, wrap the completed tapping sleeve and valve in accordance with this specification.

For 16 in. and larger taps, apply Denso or approved equal, petroleum-based tape wrapping system around the completed tapping sleeve and valve. Place the concrete thrust block behind the tapping sleeve (not over the tapping sleeve and valve).

Arrange for the mandatory inspection of the installation before backfilling. Completion of the inspection is not required before backfilling. Backfill in accordance with this specification and as shown on the plans.

If Asbestos-Cement (AC) Pipe is encountered, follow the Safety Practice outlined in the Asbestos-Cement Pipe Producers Association publication, "Recommended Work Practices for A/C Pipe," and make them "Mandatory Practices" for this project.

- 3.14. **Boxes for Valves.** Cut the cast-iron or ductile-iron pipe to the proper length, then assemble and brace the box as approved. Construct manholes over the operators of butterfly valves for sizes 30 in. and larger.

Concrete for valve box placement: For locations in new concrete pavement, use the same strength and mix design as that of new pavement. For other locations, use Class "A" Concrete, conforming to the requirements of Item 421.

Install valve box and riser piping plumbed in a vertical position. Provide 6 in. telescoping freeboard space between the riser pipe top butt end and the interior contact flange of the valve box, for vertical movement damping. Ensure the riser (bell end of pipe) rests on the valve flange, or provide a suitable foot piece to support the riser pipe.

Set, align, and adjust the valve box so that the lid is level with the final grade.

Paint the covers of new valve boxes in "Fluorescent Orange" when installed. After completion and approval by the Engineer, repaint the covers in "Black."

- 3.15. **Wet Connections.** Make the wet connections, as directed, in such a manner and at such hours to minimize inconvenience to the public. When the existing mains have been cut or a plug removed for a connection, pursue the work of making the connection without interruption until complete.

If the Contractor proceeds with a wet connection without a complete shut-off, there will be no extra compensation for damages or extra work resulting from the incomplete shut-off.

The Utility Owner will operate gate valves in the existing system and in sections of completed mains that have been placed in service. Notify the Utility Owner at least 48 hr. in advance of making connections.

Wet connections that are 2 in. or smaller are sometimes referred to on the plans as 2 in. standard connections or gooseneck connections.

Items that may be necessary to complete these types of wet connections include corporation cock, saddle, copper tubing, brass fittings, and 2 in. valves. Do not use these connections on or consider them as part of a 2 in. service line.

The Utility Owner will handle, at no cost to the Contractor, operations involving opening and closing valves for wet connections.

- 3.16. **Polyethylene Film Wrap.** Except as noted on the plans, wrap ductile-iron pipe (including fittings and other appurtenances), with a polyethylene film. Also wrap fire hydrant barrels.

Remove lumps of clay, mud, cinders, etc., on the pipe surface before installing the polyethylene encasement. Prevent soil or embedment material from becoming trapped between the pipe and the polyethylene. Fit the polyethylene film to the contour of the pipe to affect a snug, but not tight fit; encase with minimum space between the polyethylene and the pipe. Provide enough slack in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due backfilling operations. Secure overlaps and ends with adhesive tape to hold polyethylene encasement in place until backfilling operations are complete.

For installations below the water table and in areas subject to tidal actions, seal both ends of the polyethylene tube with adhesive tape at the joint overlap.

Repairs: Repair any cuts, tears, punctures, or damage to the polyethylene with adhesive tape or with a short length of polyethylene sheet or cut open tube, wrapped around the pipe to cover the damaged area, and secured in place.

Openings in Encasement: Provide openings for branches, service taps, blow offs, air valves, and similar appurtenances by making an X-shaped cut in the polyethylene and temporarily folding back the film. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut, as well as other damaged areas in the polyethylene, with tape. Service taps may also be made directly through the polyethylene. Repair any resulting damaged areas as described above.

Junctions between Wrapped and Unwrapped Pipe: Where polyethylene-wrapped pipe joins an adjacent pipe that is not wrapped, extend polyethylene wrap to cover the adjacent pipe for distance of at least 3 ft. Secure the end with circumferential turns of tape. Wrap service lines of dissimilar metals with polyethylene or suitable dielectric tape for a minimum clear distance of 3 ft. away from cast-iron or ductile-iron pipe..

- 3.16.1. **Tubular Type Wrap.** When the polyethylene film is supplied in tubular form, install it on the pipe before placing the pipe in the trench and in the following manner:

Elevate the spigot end of the pipe, brush mud and debris from the pipe, and slip a length of film (approximately 2 ft. longer than the joint of pipe) over the joint of the pipe. Wrap the film tightly around the spigot end, leaving about 1 ft. extending beyond the end of the pipe, and tape the edge down lightly with polyethylene tape.

When lifting the joint of pipe for placing in the trench, remove any remaining mud, clay, or debris. Insert the spigot end into the bell end of the joint previously placed, push home, and release the pipe into the trench. Pick up the pipe joint at the bell, slide the film to a point back of the bell, and prepare a bell hole.

When laying the next joint, pull the film beyond the bell to overlap the film attached to the spigot of the new pipe joint. Wrap the film by folding it longitudinally and tape it securely in place to prevent damage during backfill. Do not tape the end that is slipped over the last bell but bind it with twine or other approved material.

At each corporation, draw the loose material up around the corporation base and seal it with tape to insulate the 2 dissimilar metals.

Wrap fittings and fire hydrant leads, and tape or bind the wrap with heavy twine. Wrap fittings, such as bends and reducers, similarly to the method outlined above. Wrap specials, such as valves, tees, crosses, etc., by splitting, tucking, and overlapping the polyethylene tube, then closing the field-made splices with the required tape. Material to cover the valves may be acquired from excess overlapping polyethylene tubing on adjacent pipe joints. Draw the polyethylene tubing over the bell of the pipe on either side and insulate with field-made seams as described above. Completely wrap fittings and specials that require concrete blocking, before placing concrete.

- 3.16.2. **Sheet Type Wrap.** Apply sheet type wrap around the pipe either before or after positioning the pipe in the trench. Install "above ground" in a manner similar to that described above for tubular installation. Install "in trench" in a manner similar to that described below:

Cut the polyethylene sheet to a length approximately 2 ft. longer than the pipe section. Center the length to provide a 1 ft. overlap on each adjacent pipe section, bunching it until it clears the pipe ends. Wrap the polyethylene around the pipe so that it circumferentially overlaps the top quadrant of the pipe. Secure the cut edge of the polyethylene sheet at intervals of approximately 3 ft.

Lower the wrapped pipe into the trench and make up the pipe joint with the preceding section of pipe. Make shallow bell holes at joints to facilitate installation of the polyethylene. After completing the joint, make the overlap and secure the ends.

Repair cuts, tears, punctures, or other damage to the polyethylene. Proceed with installing the next section of pipe in the same manner.

- 3.16.3. **Boring or Augering Section Installation.** Use cast-iron or ductile-iron pipe with a polyurethane coating as specified in this Specification.

Provide a final seal against the intrusion of the backfill material by completely encasing the tapping sleeve with sheet vinyl of 8 mil thickness. Apply tape to secure this wrapping, using Polyken No. 900, Scotch Wrap No. 50, or approved equal, manufactured for this purpose.

- 3.17. **Disinfecting Mains and Testing for Leakage.**

- 3.17.1. **Disinfecting Mains.** The Utility Owner will furnish water for disinfecting and flushing without charge to the Contractor.

Furnish the necessary taps, risers, and jumpers of such sizes and materials as are specified by the Engineer, and install the subject material in the locations designated. Normally, each valve section of main will require two 3/4 in. taps; however, on larger mains the Engineer may order that 1-1/2 in. or 2 in. taps and risers be used.

Furnish and install the necessary temporary blind flanges, sleeves, plugs, etc., as required to disinfect and pressure test the new mains.

Use fire hydrants as blow-offs to flush newly constructed waterlines 8 in. diameter and above.

After laying and backfilling the pipe, disinfect the newly laid pipe. Unless otherwise shown on the plans, the Utility Owner will furnish and pay for the labor and materials necessary for the initial application of the disinfecting agent. Slowly fill each valves section of pipe with water and expel the air from the pipe. Furnish and install taps at the points of highest elevation, if required to accomplish this. After filling the

main with water and expelling the air, charge the pipe with the disinfecting agent and allow it to stand for 24 hr. Unless otherwise shown on the plans, the Utility Owner will then flush the main with water. After flushing, draw samples from the main and test for 2 consecutive days at a valid, approved testing facility. After samples are drawn and the test results pass, proceed with the pressure test and any necessary repairs. If the samples do not pass, re-disinfect the pipe until the samples taken are passed by the certified and approved testing facility. Unless otherwise shown on the plans, in the event that more than one disinfection of the main (or portion of the main) is required, the additional disinfection will be charged to the Contractor at rates established by the Utility Owner.

After disinfecting and flushing water lines, bacteriological tests will be performed by the Utility Owner or testing laboratory.

When test results indicate a need for additional disinfection of water lines based on Texas Department of Health requirements, assist Utility Owner with additional disinfection operations.

- 3.17.2. **Testing for Leakage.** Following the first disinfection test, subject the newly laid pipes to a hydrostatic pressure of 125 psi, unless otherwise shown on the plans. Where practicable, test pipe lines in lengths between line valves or plugs, of at most 1,500 ft. unless otherwise approved. Perform the pressure test by means of a pump connected to the pipe in a manner satisfactory to the Engineer. Furnish, install, and operate the necessary connections, pump, meter, and gauges. Before running the pressure test, ensure the meter is tested, sealed, and approved (at the Contractor's expense) by an approved, certified testing facility. Ensure the minimum duration of the test is 8 hr. If a large quantity of water is required to maintain pressure during the test, discontinue testing until the cause of the water loss is identified and corrected.

Observe the following general regulations during each leakage test for cast-iron, ductile-iron, and PVC pipe:

Except for welded steel pipe in which no leakage is permitted, ensure that pipe lines, when subjected to the specified pressure test, do not show leakage in excess of 3.19 gal. per inch of diameter, per mi., in 24 hrs.

Repair portions of the pipe showing visible leaks regardless of the total leakage shown by the pressure test. Remove and replace cracked or defective pipes, fittings, valves, or hydrants discovered by means of this pressure test with sound material. If the main is opened for any reason, re-disinfect it until satisfactory samples are obtained. Also, pressure test it until the requirements of this specification are met.

Immediately upon completing disinfection and pressure testing, remove all taps, risers, and blow-offs, then backfill the remainder of the trench in accordance with the requirements of this specification.

Perform leakage testing at no additional cost to the Department.

- 3.18. **Using Completed Sections of Mains.** The Utility Owner may use and operate portions of the water mains that are disinfected and pass the leakage test. Unless otherwise shown on the plans, operate the valves in such completed sections only with the express permission of the Utility Owner.

The use of the mains is not construed as acceptance of them and does not relieve the Contractor's responsibility for fulfilling the conditions of the contract, unless the mains are damaged due to negligence on the part of the Utility Owner.

- 3.19. **Lowering Mains.** When lowering a main, perform the initial excavation in such a manner to permit the mains to rest on a number of dirt benches. If soil conditions are unsatisfactory for dirt benches, use wooden blocks to support the mains. Then attach the pipe by using ropes, cable, or chains to overhead supports; remove the dirt benches or wooden blocks, and slowly and evenly lower the pipe into position. After lowering the mains, repair each damaged joint as directed.

- 3.20. **Copper Service Line Construction.** The use of Hays-Seal and Mueller Company catalog numbers to describe various fittings is not intended to be proprietary, but merely to indicate clearly the respective types of fittings to be furnished.

3.20.1. **Installing Service Lines.** For curb and gutter streets, lay copper service lines with a minimum 30 in. of cover from top of curb to the top of the service line. For crowned streets with open ditches, lay copper service lines with a minimum 30 in. of cover at the crown and with a minimum 18 in. of cover from the flow line of the ditch to the top of the service line. Ensure service line locations are clear of proposed paving and underground work.

Exercise caution to keep the lines free of dirt and foreign matter at all times. Assemble copper lines in an entirely slack position and free of kinks. Use service lines consisting of one continuous run of copper tubing where possible. Do not use bends greater than that originally found in the coil of tubing as packaged.

For 1-1/2 in. and 2 in. copper tubing shipped in straight lengths, use the following bend criteria:

For 2 in. copper tubing, a maximum of one 45° bend may be accomplished in a 4 ft. section; for 1-1/2 in. copper tubing, a maximum of one 45° bend in a 3 ft. section. No kinks, dents, flats, or crimps will be permitted.

Locate meters, in general, 1 ft. into the street right of way. Where this is not applicable, locate meters approximately 1 ft. from the sidewalk on the curb side. If the present meter location conflicts with proposed driveway turnouts or other proposed street improvements, shift the meter to miss the obstruction and reconnect it to the customer's service line. Reset meters at positions such that the top of the meter is 4 in. to 6 in. below the finished grade.

Where the plans call for salvaging and relocating the meter, meter box, and curb stop, remove these materials with care, thoroughly clean them, and submit them for inspection by the Engineer, before installing them in the new location. If the plans call for relocating the meter (other than at some point along the existing service line), a new service line will be required.

Where it is necessary to cross a paved street, push the service line under the paving through a pre-drilled and prepared opening. Use only full lengths of copper tubing, taking care not to damage the tubing when pulling it through the prepared hole.

A compression type union is only permitted when a full 40 ft. (60 ft. for 3/4 in. to 1 in.) length of tubing cannot completely span underneath the pavement. Do not use compression type unions under the paved street.

3.20.2. **Installing Corporation Stops.** Tap the main at a location such that a straight line passing through the meter and the corporation stop will be at 90° to the main. Locate taps in the upper portion of the main within 45° of the pipe spring line. Perform the cutting operation with an approved sharp shell cutter tool.

Install taps for service lines conforming to the requirements of Table 12. Space taps a minimum of 2 ft. apart.

Table 12
Service Tap Requirements for Service Lines

Water Main Type and Diameter	Service Size Diameter			
	3/4 in.	1 in.	1-1/2 in.	2 in.
4 in. Cast-Iron or Ductile-Iron	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
4 in. Asbestos-Cement	WBSS	WBSS	DSS, WBSS	DSS, WBSS
4 in. PVC (AWWA C 900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6 in. and 8 in. Cast-Iron or Ductile-Iron	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6 in. and 8 in. Asbestos-Cement	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6 in. and 8 in. Cast-Iron or Ductile-Iron	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6 in. and 8 in. PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
12 in. Cast-Iron or Ductile-Iron	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
12 in. Asbestos-Cement	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
12 in. PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
16 in. and up Cast-Iron or Ductile-Iron	DWBSS	DWBSS	DWBSS	DWBSS
16 in. and up Asbestos-Cement	DWBSS	DWBSS	DWBSS	DWBSS
16 in. and up PVC (AWWA C900)	DWBSS	DWBSS	DWBSS	DWBSS
DSS – Dual Strap Saddles WBSS – Wide Band Strap Saddles DWBSS – Dual Wide Band Strap Saddles				

- 3.20.3. **Installing Curb Stops.** Set curb stops or angle stops only at the outer end of the service line just ahead of the meter. Secure the opening in the curb stop to prevent unwanted material from entering. Use eighth bend or quarter bend couplings to accomplish close quarter turns in the service line.

In 3/4 in. and 1 in. services, install a meter coupling or swivel nut meter spud curb stop, ahead of the meter. Also install a straight meter coupling on the outlet end of the meter. Install a new curb stop when the service line is extended.

- 3.20.4. **Sequence of Work.** Open the trench for the proposed service line or prepare the jacking and receiving pits. Install the corporation stop in a workmanlike manner using the proper equipment.

Install the copper service line and connect it to the corporation stop.

Install the curb stop on the meter end of the service line.

With the curb stop open, and before connecting the service line to the meter, open the corporations stop and flush the service line adequately. Close the curb stop, leaving the corporation stop in the full open position.

Check the service line for apparent leaks. Repair leaks before proceeding.

Connect the service line to the meter and, if necessary, adjust the meter location. Use care to ensure that the inlet side of the meter is connected to the water service line. Momentarily open the curb stop to verify proper registration of the meter.

Backfill the excavations, tamping the backfill material in place to the density of the soil in the adjacent trench walls.

If relocating the meter, relocate the meter box so that it is centered over the meter with the top of the lid flush with the finished grade. When the meter must be located in driveways or sidewalks furnish and install an approved traffic type meter box with a cast-iron lid.

- 3.21. **Cutting and Plugging Water Mains.** Where the plans call for abandoning water mains, adhere to the following general procedure:

After constructing, disinfecting, testing, and placing the replacement main in service, and services are transferred to the replacement main, locate the main to be abandoned, trace it back to the feeder main, and at this point cut and plug it at the tee. Normally, installing a plug, clamp, and a concrete thrust block does this. In cases of 1-1/2 in. or 2 in. corporation cock or tapping sleeve and valve (TS&V) connections,

remove the valve and install a cap or plug at the tee. Ensure the line to be abandoned is not valves off at the nearest valve, nor cut and plugged other than at the supply main.

Adequately plug the ends or openings in abandoned mains or cap them in an approved manner and replace excavation, backfill, and any street surfaces, to the Engineer's satisfaction. Perform this work in accordance with Sections 3.1., "Excavation," and 3.11., "Backfilling."

Remove surface identification, i.e., valve boxes and fire hydrants. Where valve boxes are in improved streets (other than shell), pouring valve boxes full of concrete with the cap permanently removed is permitted.

Do not remove plugs during the months of peak water demands, June, July, and August, unless otherwise approved

- 3.22. **Service Lines of Public Utilities.** Where any pipe or conduit of a public utility corporation crosses the water main trench, support such pipe or conduit in a manner satisfactory to the Engineer.

If the Contractor considers it necessary for a utility company to relocate their utility lines or other improvements, notify the Engineer in advance.

If the Engineer considers it imperative to make the change, the Engineer will make the necessary arrangements with the utility company.

- 3.23. **Relocating Meter Vaults.** Salvage existing valves, meters, and strainers from inside the vault and return them to the Utility Owner, or as designated on the plans.

Install pipe, valves, service lines, and other appurtenances in accordance with the sections of this specification or as directed.

In general, install the type of meter vault shown on the plans or as approved.

- 3.23.1. **Precast Concrete Vault.** Construct and furnish the precast concrete vault as shown on the plans.

Set the precast concrete vault level on a minimum 3 in. bed of sand in an excavation and bring it to grade. Then install piping and backfill with sand around the vault.

- 3.23.2. **Cast-in-Place Concrete Vault.** Construct the cast-in-place concrete vault as shown on the plans. Key the walls to the floor slab and form to the dimensions shown on the plans. Provide a minimum wall thickness of 4 in. Cast the walls monolithically. One cold joint is allowed when the vault depth exceeds 12 ft. Set the frame for the cover while the concrete is still green.

- 3.23.3. **Frame and Cover.** Construct the frame and cover as shown on the plans.

In grass areas, set the frame and cover 2 in. to 3 in. above the natural ground or finished grade and parallel to it (the maximum allowable angle from horizontal is 20°). Slope the backfill away from the meter.

In sidewalk areas, set the frame and cover 1/2 in. to 1 in. above the adjacent concrete and parallel to it. Slope the replacement concrete away from the meter to meet the adjacent concrete.

- 3.23.4. **Inspections.** The following inspections will be made jointly by the Engineer and representatives of the Utility Owner:

- Site Location Inspection - to obtain the required approval of proposed meter location before commencing work.
- Final Inspection – conducted after the backfill is in place, the cover is installed, the cleanup is completed, and the surface is restored.

3.24. **Adjusting Existing Surface Structures.**

- 3.24.1. **Valve Boxes.** Salvage and reuse the valve box. Remove and replace the 6 in. ductile-iron riser pipe with a suitable length for the depth of cover required to establish the adjusted elevation to accommodate the actual finished grade.

Reinstall the valve box and riser piping plumbed in a vertical position. Provide a minimum of 6 in. telescoping freeboard space between the riser pipe top butt end and the interior contact flange of the valve box, for vertical movement damping.

After setting, aligning, and adjusting the valve box so that the top lid is level with the final grade, place a 24 in. by 24 in. by 8 in. thick concrete block around the valve box. Center the valve box horizontally within the concrete box.

- 3.24.2. **Meter Boxes.** Salvage and reuse meter boxes when possible. Reinstall them in conformance with the manufacturer's recommendations. Repair any damage sustained by the meter box during relocation or service transfer, at no expense to the Department.

If the existing meter box requires replacement, the Contractor may obtain a new box from the Utility Owner by providing adequate documentation of the existing and proposed locations.

- 3.24.3. **Meter Vaults.** Adjust meter vaults in conformance with the details shown on the plans. Salvage and reuse access covers.

- 3.25. **Relocating Water Meters and Boxes.** Salvage, clean, inspect, and install existing curb stops, meters, unions, and meter boxes at the new locations in conformance with specifications in this section. When the meter and box is relocated, move it the minimum distance to enable access for new connections. Repair any damage sustained by the meter box during relocation or service transfer, at no expense to the Department.

If unable to salvage the existing boxes, the Contractor may obtain new boxes from the Utility Owner by providing proper documentation of the existing and proposed locations of the meter.

When approved, the Contractor may relocate meter boxes located adjacent to existing pavement, if this operation facilitates construction or decreases the costs. Obtain written approval of the Engineer and perform this work, including excavation, piping, meter box relocation, removal and replacement of paving, etc., at no cost to the Department.

- 3.26. **Installing Split Casing.** Notify the Utility Owner at least 48 hr. in advance of any work planned involving existing water lines. Do not, at any one time, expose more than 20 ft. of water lines to be encased.

Place 6 in. x 6 in. x 1-1/4 in. neoprene pads between the split casing sections and the top and bottom of the water lines spacing them at approximately 6 ft. or as directed.

Ensure the completed and shaped trench to receive the casing is of wide enough to provide free working space for satisfactorily installing the casing and backfilling under and around the casing.

Hold the split casing in place for welding by using hinges, coupling bands, or any other acceptable method.

Use a casing diameter not less than the outside dimension of the pipe at its longest dimension plus 4 in.

Perform welds conforming to the requirements of AWWA Standard C 206. Provide welds capable of developing the full strength of the pipe throughout the joint and casing split.

Seal the ends of the encasement pipe with casing and seals in accordance with Section 2.2.1., "Steel Carrier Pipe," to prevent the entrance of the excessive ground water.

- 3.27. **Modifications for Cathodic Protection.**
- 3.27.1. **General.** Provide cathodic protection systems as shown on the plans.
References to steel pipe apply to tape-coated welded steel pipe. If damage occurs to the pipe coatings during the welding process, refurbish the affected area to its original condition.
- 3.27.2. **Bonded Joints.** Where rubber gasket bell and spigots are provided, provide for bonded joints by either welding a strap or clip between the bell and the spigot of each joint, or by providing a Thermite-welded cable between the bell and the spigot of each joint. Provide pipes, whether installed in a tunnel or open cut, with bonded joints, except where providing insulating flanges. Where welding joints for thrust restraint, no additional bonding is required.
- Bonding Strap or Clip: Provide a strap or clip for bonding the bell to the spigot, that is free of foreign material that could increase the contact resistance between the wire and the strap or clip.
- Unless otherwise noted, provide insulation kits at connections to the existing water system, at locations to isolate one type of cathodic system from another type, between the water main and extra piping, or as shown on the plans.
- 3.28. **Removing and Salvaging Fire Hydrants and Water Meters.** Deliver removed and salvaged fire hydrants and water meters to the Utility Owner at the location shown on the plans, or as directed.
- 3.29. **Installing the Nonmetallic Pipe Detection System.** Install the nonmetallic pipe detection system concurrently with placing the proposed pipe. Install as specified by the manufacturer and as approved.
- 3.30. **Removing Water Mains and Removing Water Mains with Casing.** Remove water mains and water mains with casing in accordance with Item 100, or as shown on the plans. This includes removing and disposing of pipe and appurtenances as shown on the plans or as directed. Perform related excavation and backfilling, as required, at no additional cost the Department.
- 3.31. **Adjusting Manholes.** Perform work in accordance with Item 465. Excavate and backfill in accordance with Item 400. Carefully remove and temporarily store as directed, manhole and inlet rings, covers, plates, and grates to be reused. Clean mortar and grease from the contact areas of reused items. Dispose of unused removed material as directed. Use construction methods described in Sections 479.3.1, "Lowering the Top of a Manhole or Inlet," and 479.3.2, "Raising the Top of a Manhole or Inlet," unless otherwise shown on the plans.
- 3.31.1. **Lowering the Top of a Manhole or Inlet.** Remove a sufficient depth of brick courses or concrete to permit reconstruction on a batter not exceeding 1 in. horizontal to 2 in. vertical. Where brickwork is present, clean the mortar from the top course of brick. Rebuild the manhole or inlet to the original top dimensions or to the dimensions shown in the plans. Install the manhole or inlet ring and the cover, plate, or grate to conform to the proposed new surface contour.
- 3.31.2. **Raising the Top of a Manhole or Inlet.** Clean the top surface of brick or concrete. Construct to the proper new elevation using new brick, brick salvaged from other manholes or inlets, prefabricated metal extension rings, concrete rings, or Class A concrete. Install the manhole or inlet ring and the cover, plate, or grate to conform to the proposed new surface contour. Install prefabricated extension rings in accordance with manufacturer's instructions.

4. MEASUREMENT

- 4.1. **Water Main Pipe and Steel Casing.** Measured by the foot, of the various sizes and types specified. Water mains and casing will be measured along the axis of the pipe and no deductions will be made for valves or fittings. Reducers will be classed as pipe of the size of the larger end.

Unless otherwise shown on the plans, Fire Hydrant Branches (Leads) will be measured by the foot, of the various types and installation methods specified, along the axis of each branch (lead) from the hydrant to the end of the branch (lead). No deductions will be made for valves or fittings.

- 4.2. **Split Steel Casing.** Measured by the foot, of the various sizes shown on the plans.
- 4.3. **Fiberglass Reinforced Plastic (FRP) Pipe for Casing.** Measured by the foot, of the various sizes shown on the plans.
- 4.4. **Jacking, Tunneling, Boring, or Augering.** Jacking, Tunneling, Boring, or Augering for water mains and steel casing will be measured by the foot, of the sizes, types, and wall thickness (applicable only for casing) specified.
- Jacking, Tunneling, Boring, or Augering for fire hydrant branches (leads) will be measured by the foot, of the various types specified.
- 4.5. **New Copper Service Lines.** Measured by each service line installed.
- Short Side service line refers to service connections made to meters located on the same side of the street as the supply main is located. Long Side service line refers to service connections made to meters located on the opposite side of the street from the supply main, or from the center of the street, where the supply main is located in the center of the street.
- 4.6. **Gate Valves, Tapping Sleeves and Valves, and Butterfly Valves.** Measured by each assembly installed, of the various sizes specified, except that gate valves 20 in. in diameter and smaller, are subsidiary to the water lines.
- 4.7. **Fire Hydrants.** Measured by each assembly installed, including a 6-in. gate valve and box, regardless of depth. It is the Contractor's responsibility to install the fire hydrant assembly such that it meets the standard installation requirements of this specification and the manufacturer's specifications.
- Fire Hydrant Branches (Leads) will be measured as indicated in Sections 4.1., "Water Main Pipe and Steel Casing" and 4.4., "Jacking, Tunneling, Boring, or Augering."
- 4.8. **Meters and Vaults.** Measured by each assembly constructed.
- 4.9. **Air Release and Vacuum Relief Valves.** Measured by each assembly, of the various sizes, with the valve box installed.
- 4.10. **Pressure Reducing Stations.** Measured by the lump sum unit constructed.
- 4.11. **Blow Off Valves.** Measured by each assembly, of the various sizes and types, with the valve box installed.
- 4.12. **Removing Fire Hydrants.** Measured by each assembly removed and disposed of properly.
- 4.13. **Removing Water Valves and Boxes.** Measured by each assembly removed and disposed of properly.
- 4.14. **Removing and Relocating Meters and Boxes.** Measured by each assembly removed, cleaned, and installed at the new location.
- 4.15. **Removing Meters and Vaults.** Measured by each assembly removed and disposed of properly.
- 4.16. **Removing and Salvaging Water Meters.** Measured by each assembly removed and salvaged.
- 4.17. **Removing and Salvaging Fire Hydrants.** Measured by each assembly removed and salvaged.

- 4.18. **Removing and Relocating Water Meters and Meter Vaults.** Measured by each assembly removed and relocated.
- 4.19. **Adjusting Meter Vaults.** Measured by each assembly adjusted.
- 4.20. **Adjusting Meter Boxes.** Measured by each assembly adjusted.
- 4.21. **Adjust or Relocate Water Meter.** Measured by each assembly adjusted or relocated.
- 4.22. **Lowering Water Mains.** Measured by the foot, of the sizes and types of pipe lowered.
- 4.23. **Cutting and Plugging Water Mains.** Measured by each location a water main is cut and plugged, of the sizes indicated.
- 4.24. **Removing Pressure Reducing Stations.** Measured by each complete pressure reducing station removed.
- 4.25. **Wet Connections.** Measured by each connection, of the sizes specified.
- 4.26. **Extra Hand Excavation or Extra Machine Excavation.** Measured by the cubic yard in its original position. Excavation performed by manual labor at the locations specifically designated by the Engineer, and which is not included under or subsidiary to other bid items contained in this specification, is considered Extra Hand Excavation or Extra Machine Excavation.
- 4.27. **Adjusting Manholes.** Adjusted manholes will be measured as each manhole adjusted.

5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit prices bid for the items of work described below. These prices are full compensation for furnishing, hauling, placing, and installing the materials; for inspecting and testing; and for other materials, labor, equipment, tools, and incidentals.

- 5.1. **Water Main Pipe and Steel Casing.** Payment for water main pipe, and steel casing will be made at the unit prices bid for "Water Main Pipe (Cast-Iron)," "Water Main Pipe (Steel)," "Water Main Pipe (Ductile Iron)," "Water Main Pipe (Copper)," "Water Main Pipe (Polyvinyl Chloride)(PVC)," and "Casing (Steel)," of the various sizes and types specified, installed by the open-cut method.
- Unless otherwise shown on the plans or specifications, excavating, disposing of unsuitable excavated material, backfilling, and the material for backfill, for the complete installation of the water main system, are subsidiary to this bid Item.
- 5.2. **Split Steel Casing.** Payment for split steel casing will be made at the unit price bid for "Split Steel Casing," of the various sizes specified, installed by the open cut method.
- 5.3. **Fiberglass Reinforced Plastic (FRP) Pipe for Casing.** Payment for Fiberglass Reinforced Plastic (FRP) Pipe for Casing will be made at the unit price bid for "Fiberglass Reinforced Plastic (FRP) Pipe for Casing" of the various sizes specified.
- 5.4. **Jacking, Tunneling, Boring, or Augering.** Payment for jacking, tunneling, boring, or augering water main will be made at the unit price bid for "Jacking, Tunneling, Boring, or Augering (Water Main)," of the sizes and types specified. This price includes furnishing the pipe.

Payment for jacking, tunneling, boring, or augering fire hydrant branches (leads) will be made at the unit price bid for "Jacking, Tunneling, Boring, or Augering Fire Hydrant Branch (Lead)(6 in.)," of the types and installation method specified. This price includes furnishing the pipe.

Payment for jacking, tunneling, boring, or augering steel casing will be made at the unit price bid for "Jacking, Tunneling, Boring, or Augering Casing (Steel)," of the sizes, types, and wall thickness (applicable only if exceeding minimum thickness, shown in Section 2.2.2, "Steel Casing Pipe") specified. This price includes the casing. Water mains and fire hydrant branches (leads) placed in the casing will be paid for by the appropriate bid item.

Excavating, backfilling, backfill material, and disposing of unsuitable excavated material for jacking, tunneling, boring, or augering pits are subsidiary to these bid items.

- 5.5. **New Copper Service Lines.** Payment for copper service lines will be made at the unit price bid for "Service Line (Short Side 5/8 in. to 1 in.)," "Service Line (Long Side 5/8 in. to 1 in.)," "Service Line (Short Side 1-1/2 in. to 2 in.)" and "Service Line (Long Side 1-1/2 in. to 2 in.)," installed. This price is full compensation for labor, materials, excavation, and backfill required to install the facility, including connection to the customer's service line.
- 5.6. **Gate Valves, Tapping Sleeves and Valves, and Butterfly Valves.** Payment for gate valves (larger than 20 in. in diameter), tapping sleeves and valves, and butterfly valves will be made at the unit price bid for "Gate Valve," "Tapping Sleeve and Valve," and "Butterfly Valve," of the various sizes specified, with the valve box installed.
- 5.7. **Fire Hydrants.** Payment for fire hydrants will be made at the unit price bid for "Fire Hydrant Assembly," including 6 in. gate valve and box, installed regardless of barrel depth.
- Payment for fire hydrant branches (leads) will be made at the unit price bid for "Fire Hydrant Branch (Lead) (6 in.)" installed by the open-cut method.
- Any adjustment required either in the flow line of the water main or to the barrel length of the fire hydrant is subsidiary to this bid item.
- 5.8. **Meters and Vaults.** Payment for meters and vaults will be made at the unit price bid for "Meter and Vault" constructed.
- 5.9. **Air Release and Vacuum Relief Valves.** Payment for air release and vacuum relief valves will be made at the unit price bid for "Air Release and Vacuum Relief Valve," of the various sizes specified, with the valve box installed.
- 5.10. **Pressure Reducing Stations.** Payment for pressure reducing stations will be made at the unit price bid for "Pressure Reducing Station." This price is full compensation for performing the necessary excavation, backfill, finish grading, constructing the concrete structure, and furnishing and installing station appurtenances addressed under Article 2, "Materials," of this specification.
- 5.11. **Blow Off Valves.** Payment for blow off valves with boxes will be made at the unit price bid for "Blow Off Valve" of the various sizes and types specified, with the valve box installed.
- 5.12. **Removing Fire Hydrants.** Payment for removing fire hydrants will be made at the unit price bid for "Removing Fire Hydrant." This price includes removing valves from the existing location, disposing of the valves, and plugging at the tee. Excavation and backfill required for removing fire hydrants are subsidiary to this bid item.
- 5.13. **Removing Water Valves and Boxes.** Payment for removing water valves and boxes will be made at the unit price bid for "Removing Water Valve and Box." Excavation and backfill required for removing water valves and boxes are subsidiary to this bid item.
- 5.14. **Removing and Relocating Meters and Boxes.** Payment for removing and relocating meters and boxes will be made at the unit price bid for "Removing and Relocating Meter and Box."

- 5.15. **Removing Meters and Vaults.** Payment for removing meters and vaults will be made at the unit price bid for "Removing Meter and Vault." This includes salvaging the meter strainers and valves and delivering them to their owner at the location shown on the plans or as directed.
- 5.16. **Removing and Salvaging Water Meters.** Payment for removing and salvaging water meters will be made at the unit price bid for "Removing and Salvaging Water Meter." This price includes removing salvaged water meters from the existing locations and delivering them to the owner. Excavation, backfill, and finish grading required for removing the water meters are subsidiary to this bid item.
- 5.17. **Removing and Salvaging Fire Hydrants.** Payment for removing and salvaging fire hydrants will be made at the unit price bid for "Removing and Salvaging Fire Hydrant." The salvaging of fire hydrants will be a cash reimbursement to the owner by the Contractor where the fire hydrants will become the property of the Contractor or the Contractor will deliver the fire hydrants to the Utility Owner at the location shown on the plans. Excavation, backfill, and finish grading required for removing fire hydrants are subsidiary to this bid item.
- 5.18. **Removing and Relocating Water Meters and Meter Vaults.** Payment for removing and relocating water meters and meter vaults will be made at the unit price for "Removing and Relocating Water Meter and Meter Vault."
- 5.19. **Adjusting Meter Vaults.** Payment for adjusting meter vaults will be made at the unit price bid for "Adjusting Meter Vault." This price is full compensation for furnishing the required materials, including backfill as required, excavation, tools, labor, equipment, and incidentals.
- 5.20. **Adjusting Meter Boxes.** Payment for adjusting meter boxes will be made at the unit price for "Adjusting Meter Box."
- 5.21. **Adjust or Relocate Water Meter.** Payment for adjusting or relocating water meters will be made at the unit price for "Adjusting or Relocating Water Meters." This price is full compensation for adjusting or relocating water meters. Miscellaneous fittings required to complete the work will not be paid for directly, but will be subsidiary to this item unless otherwise shown on the plans. Water line sterilization and testing of the completed water main system is considered subsidiary to this item.
- 5.22. **Lowering Water Mains.** Payment for lowering water mains will be made at the unit price bid for "Lowering Water Mains," of the sizes and types of pipe lowered. This price is full compensation for lowering and adjusting pipes, as well as any connected valves, boxes, and service lines. Excavation and backfill required for lowering water mains are subsidiary to this bid item.
- 5.23. **Cutting and Plugging Water Mains.** Payment for cutting and plugging water mains will be made at the unit price bid for "Cut and Plug Water Main," of the sizes indicated. This price is full compensation for performing excavation, backfill, finish grading, and other incidental items required to abandon or cut and plug the water main as set forth this specification. Where grout is required, as shown on the plans, it is subsidiary to this bid item.
- 5.24. **Removing Pressure Reducing Stations.** Payment for removing pressure reducing stations will be made at the unit price bid for "Removing Pressure Reducing Station." This price is full compensation for performing the necessary excavation, backfill, finish grading, pipe removal, structure removal, and for tools, equipment, and incidentals.
- 5.25. **Wet Connections.** Payment for wet connections will be made at the unit price bid for "Wet Connections," of the sizes specified.
- 5.26. **Extra Hand Excavation or Extra Machine Excavation.** Payment for extra hand excavation or extra machine excavation will be made at the unit price bid for "Extra Hand Excavation" or "Extra Machine Excavation." This price is full compensation for labor, hand tools, machines, dewatering, and handling and properly disposing of any excess excavated material not suitable for bedding or backfill for this project.

5.27.

Adjusting Manholes. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Water Main (Adj Exist Manhole)." This price is full compensation for replacement of Air Release / Vacuum Release Valve and installation of the Standard Bollards as shown on the plans; for materials including backfill as required, and for excavation, tools, equipment, labor, and incidentals.

Trench excavation protection or temporary special shoring for trenches greater than 5 ft. in depth, or sloping the sides of these trenches to preclude collapse, will be measured and paid for as required by Item 402, "Trench Excavation Protection," or Item 403, "Temporary Special Shoring."

Furnishing and placing bedding material is subsidiary to the various bid items.

Providing fittings, including necessary concrete thrust blocking, pipe clamps, nipples, pipe coatings, and lubricants, etc. is subsidiary to the water mains in which they are installed.

In addition, providing fittings required due to plan changes or alterations in line and grade, is subsidiary to the water mains in which they are installed.

Furnishing and installing taps, risers, jumpers, blind flanges, cast-iron sleeves, plugs, reducers etc., as required to disinfect and pressure test the new mains is subsidiary to the various bid items. In addition, necessary excavation and backfill, site grading, and maintenance until completion of pressure testing are subsidiary to the various bid items.

Unless otherwise shown on the plans, the work performed and materials furnished to support the pipes or conduits of public utilities are subsidiary to the various bid items.

Furnishing and installing the nonmetallic pipe detection system, as well as the labor and materials necessary for the system, is subsidiary to the various bid items. In addition, ensure that the detection system is complete, operational, and satisfactory to the Utility Owner.

Adjusting valve boxes is subsidiary to the various bid items.